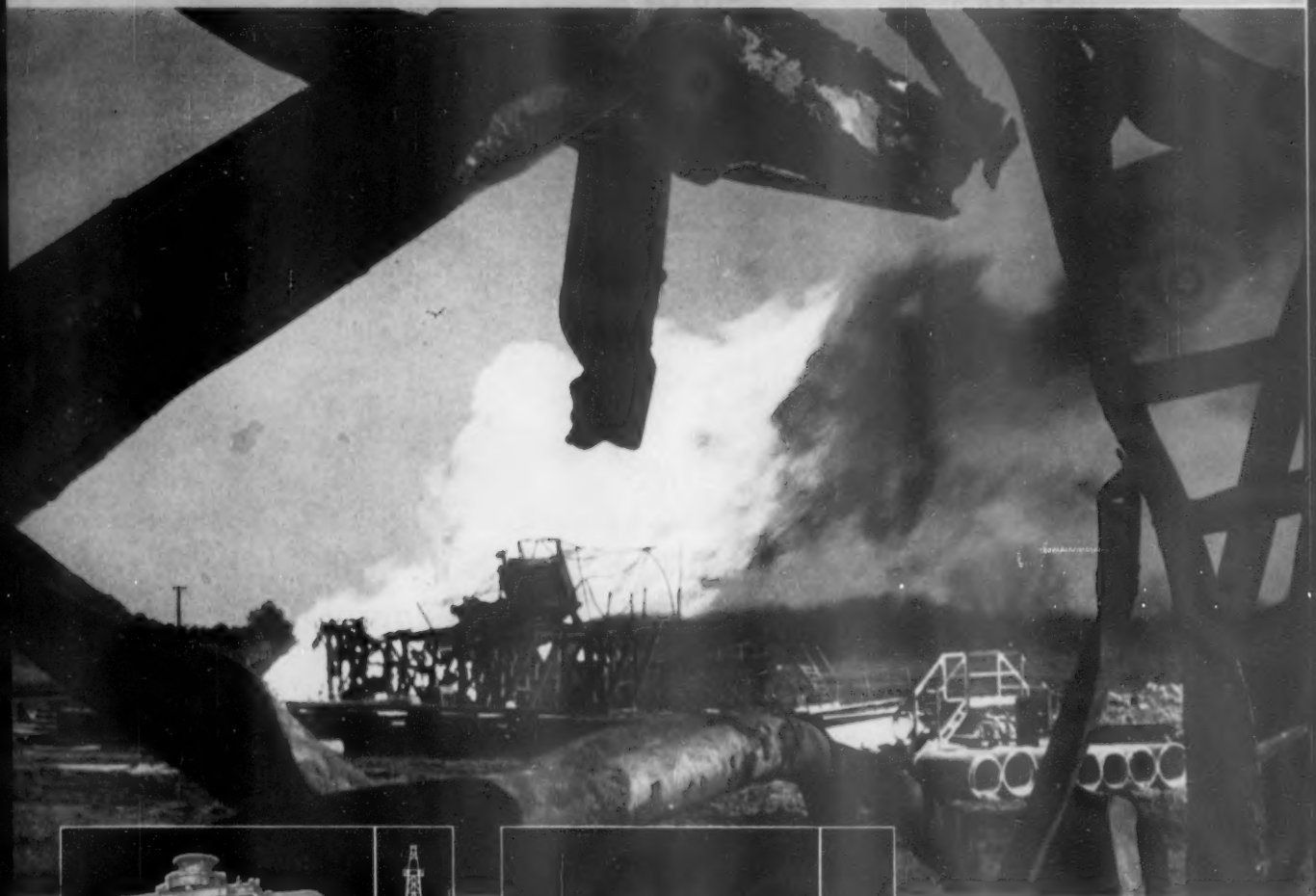
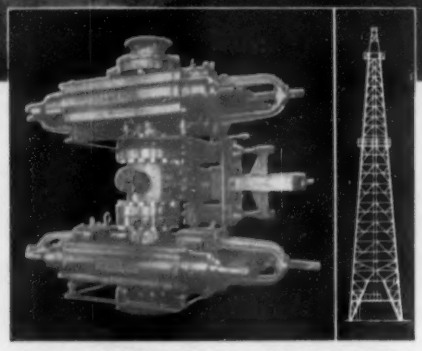
WORLD-WIDE OIL

The OIL AND GAS JOURNAL





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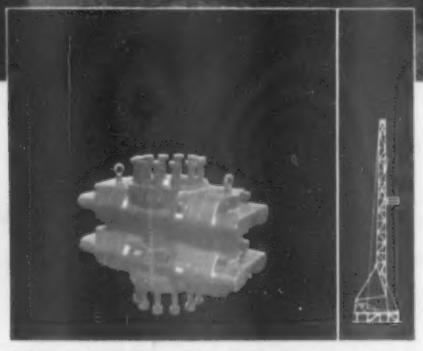

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Styled by prominent industrial designer to complement modern office surroundings.

Mechanically Calculates All Makes of Orifice Meter Charts With Improved Capacity, Flexibility and Operating Ease

As perfected by Rockwell, there never was a more successful or useful machine than the original chart calculating Integrator. In this new model we have retained the basic mechanical theory, expanded its operating scope, simplified the design and housed the entire unit in a streamlined case.

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The OIL AND GAS JOURNAL

DECEMBER 27, 1954 VOL. 53 NO. 34

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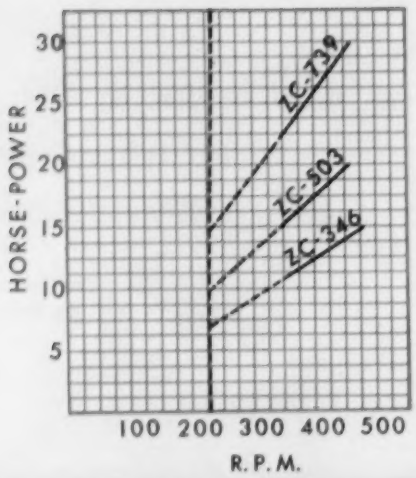
In Brief . . .

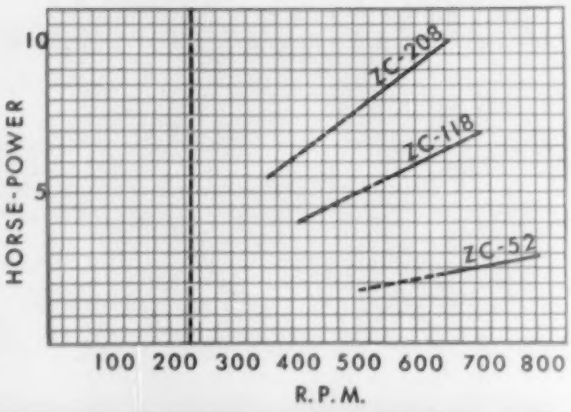
The Journal's international oil survey shows that the oil business in most branches of its activity is growing at a faster rate abroad than it is in the United States. In the Eastern Hemisphere the postwar development of the vast reserves of the Middle East has been spurred by the existence of a large marketing potential. Industrialization and a rising standard of living in many foreign areas have encouraged petroleum industry expansion.

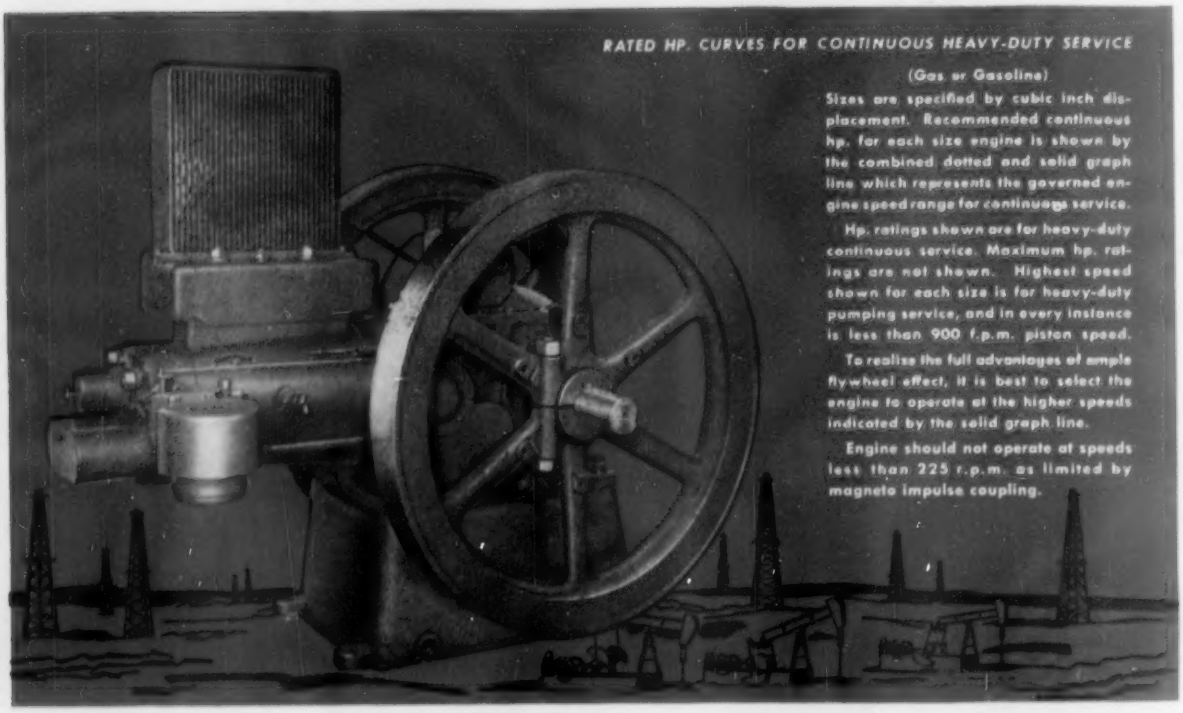
Foreign crude-oil reserves are considerably above the estimates of a year ago. Exploration activity is widespread and intensive, and many prospects regarded as offering no possibilities a decade ago are being reexamined today.

Crude-oil production and petroleum consumption abroad show increases for the past year of from 8 to 10 per cent. Foreign refining capacity is estimated to have risen 6 per cent during the year, thus establishing a year-end total of nearly 7,200,000 bbl. daily.

The politico-legal outlook for the industry abroad also has improved during the past year. The overshadowing event was the settlement of the Iranian controversy in August. This agreement is a tribute to the ingenuity of the government and industry figures who participated in the negotiations. In Latin America, there have been increasing signs that barriers to private and foreign capital may be lowered. A long-standing dispute was settled in Egypt, a petroleum law was drafted in Lybia, and new legislation abolishing the state exploration monopoly was passed in Turkey.



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Notice the difference in sludge on the oil screen and timing gear cover on the left as compared to the clean appearance of the corresponding parts at the right. Those on the left were operated on a representative heavy-duty motor oil (for service MS and DG). The cleanliness of those on the right resulted from the use of the same base oil to which only Du Pont Lube Oil Additive 564 plus an antioxidant had been added.

. . . polymeric additives offer solution to your low-duty sludge problems

A new solution to engine oil sludge problems, particularly those caused by low-power, low-temperature, and other low-duty driving conditions is now possible. This is especially significant in helping promote your product to the mass passenger car market, and is also of interest to the operators of urban fleets—taxis, buses and delivery services.

The solution of sludge problems is available through the use of new polymeric lube oil additives by Du Pont. Being outstanding detergents and viscosity-index improvers, these double-action additives are exceptionally effective under stop-and-go driving conditions. They are especially effective in retarding sludge formation on all engine parts in contact with lubricating oil. As a result, Du Pont Polymeric Lube Oil Additives help maintain good engine lubrication and extend the useful life of your customers' engines.

Leave No Deposit

Polymeric lube oil additives, being ashless detergents, permit more efficient operation of the engine oil system. Oil screens and filters are kept clean and free from sludge. The resulting free flow of oil through the engine keeps it in better operating condition.

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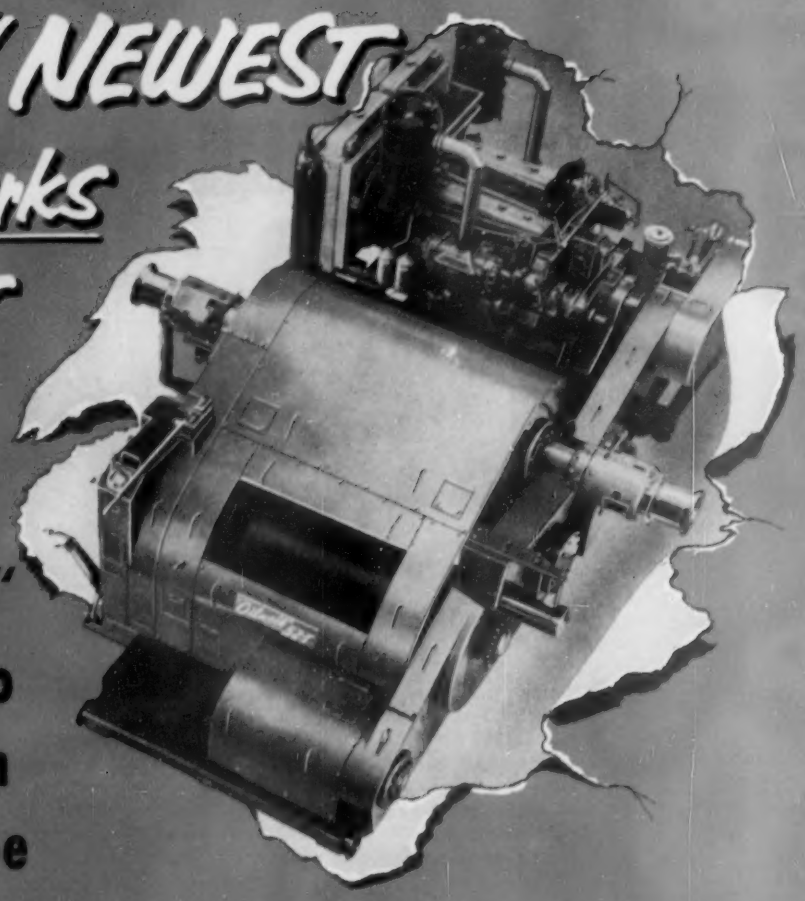
"Oilwell's" NEWEST Draw Works No. 52-T



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YOU'LL LIKE THE COMPACTNESS with which both torque converter and high-speed hydromatic brake are built-in on this draw works. Everything, including prime mover, is mounted on a unitized skid base for single-load moving under normal conditions.

One or two engines, developing 250-350 hp. can be accommodated . . . and weight, less engines, catheads and sand reel, but including optional hydromatic brake, is only approximately 20,000 lbs.

A heavy-duty torque converter is standard in the transmission system. Two hoisting speeds and one reverse are provided.

Drum is 16-inch diameter and 41½ inches long. 306° equalizing wrap-type brakes operate on 8-inch flanges, 40 inches in diameter.

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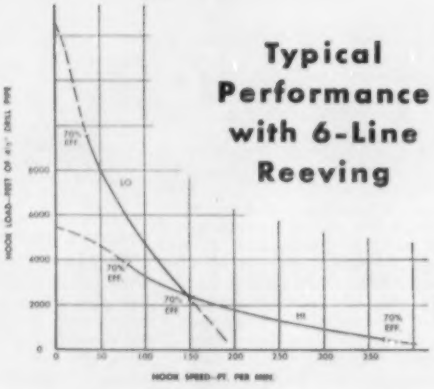
***BEFORE YOU BUY...** any draw works in this class, ask your "Oilwell" representative for full information and specifications on the "Oilwell" No. 52-T.*



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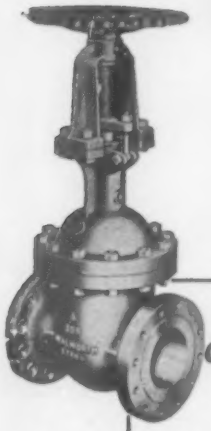

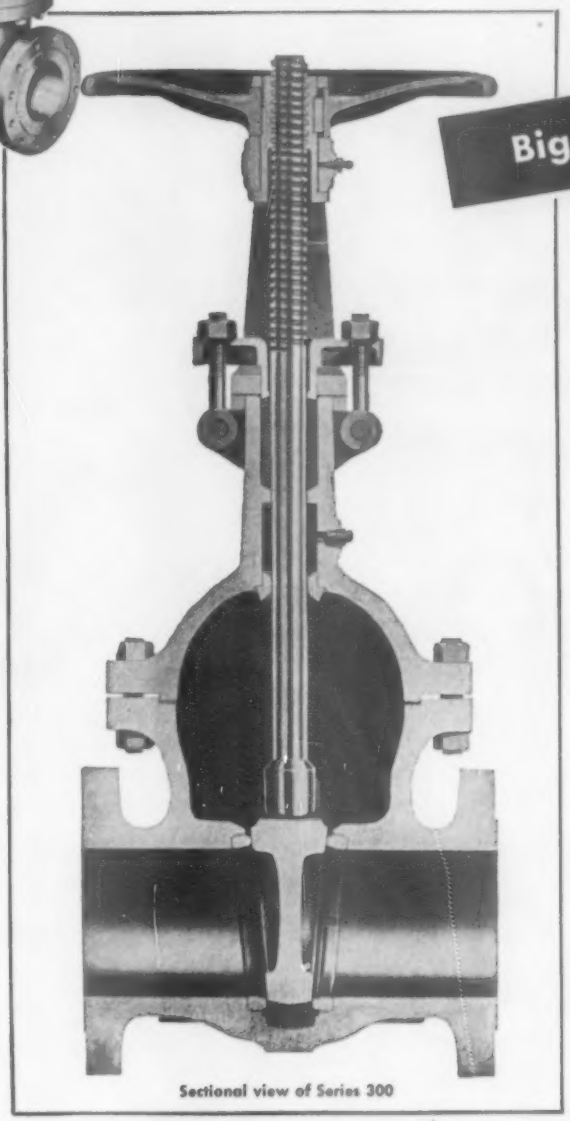

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Big 8-Point Superiority!

Gland clearances are such that stem cannot be scored if gland should be tightened unevenly.

Deep Stuffing Boxes in all sizes (2" to 24") insure tightness and maximum packing life – costly leaks are eliminated.

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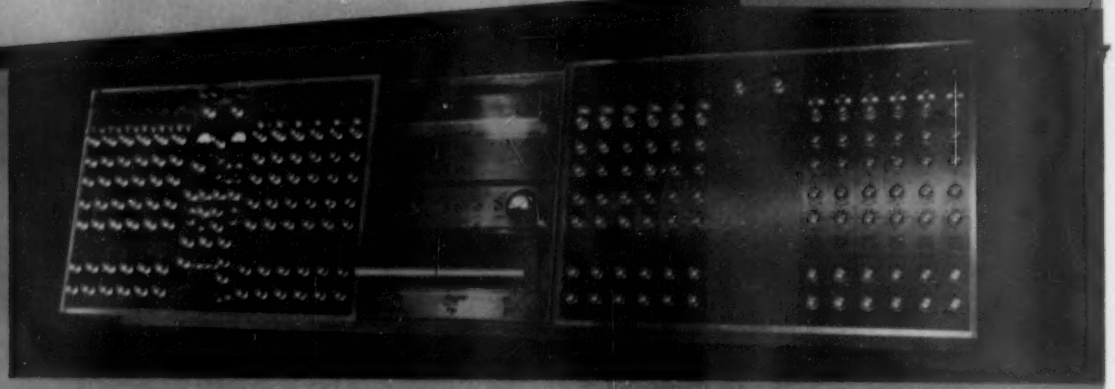
SIE

G-22 *Universal* SEISMOGRAPH SYSTEM

for "Critical Area" Recording



Recommendations and performance standards from the industry's foremost geophysical laboratories charted the development of the G-22 Universal SEISMOGRAPH SYSTEM. To meet these requirements SIE engineers have originated an entirely new "transistorized" AGC circuit which provides AGC control from ½ microvolt to ONE VOLT input level. New amplifier circuitry and special SIE transformers reduce harmonic distortion to less than 1%.

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- Individual Channel Paralleling and Testing Switches.
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- For use with MR-4 Magnetic Recording System or RO-22 Photographic Oscillographs.

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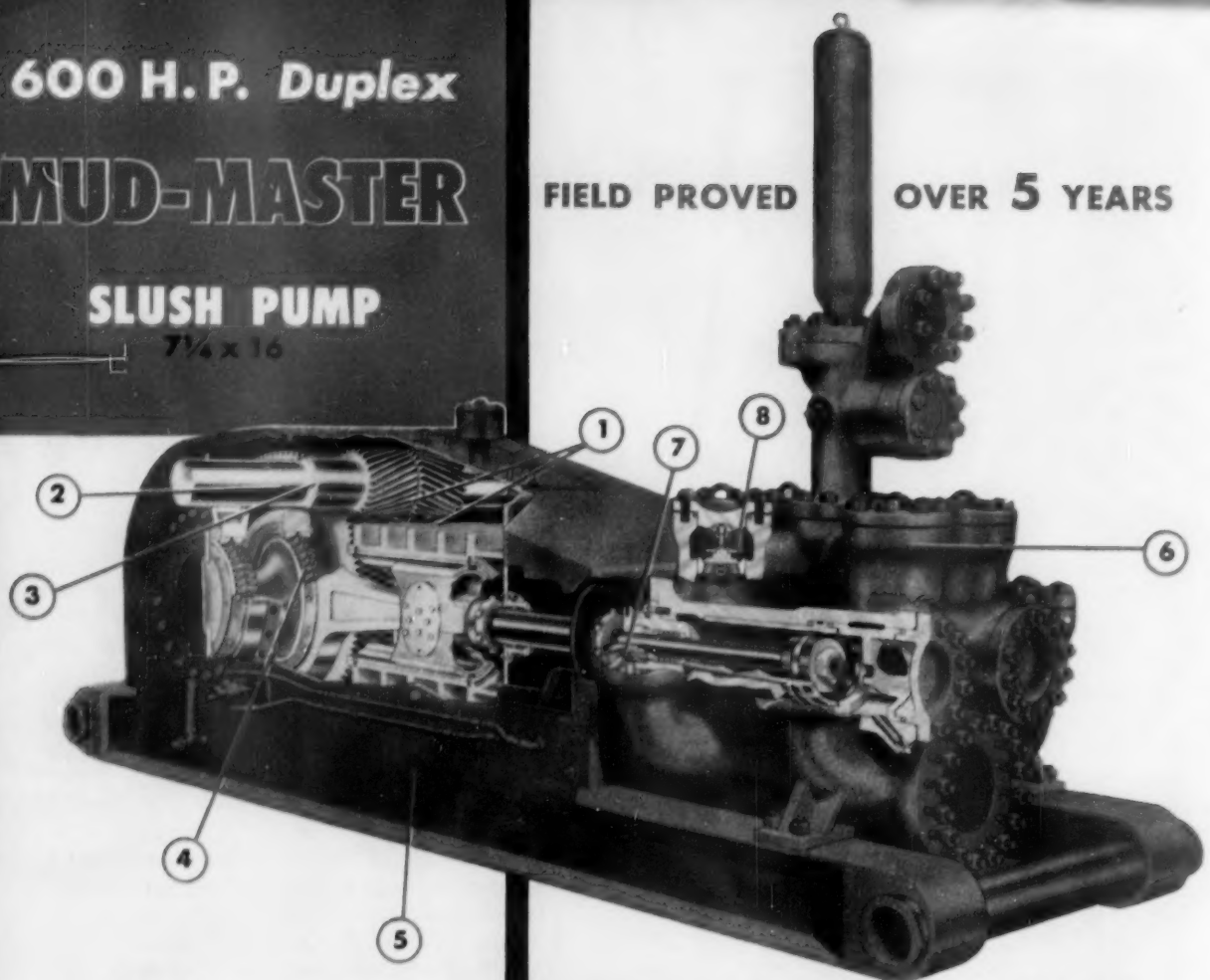
MUD-MASTER

SLUSH PUMP

7¼ x 16

FIELD PROVED OVER 5 YEARS



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Check these Features:

1. Herringbone gears are 16 inches wide for high-strength, long life.
2. Power end has positive *flood* lubrication.
3. Pinion and shaft are integrally forged.
4. Pre-loaded tapered connecting rod bearings with 21-inch O.D.
5. Skids and frame are stress-relieved integral FABRIFORM all-steel construction.
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7. Fluid end has *built-in* rod oiling system, screw-type packing gland.
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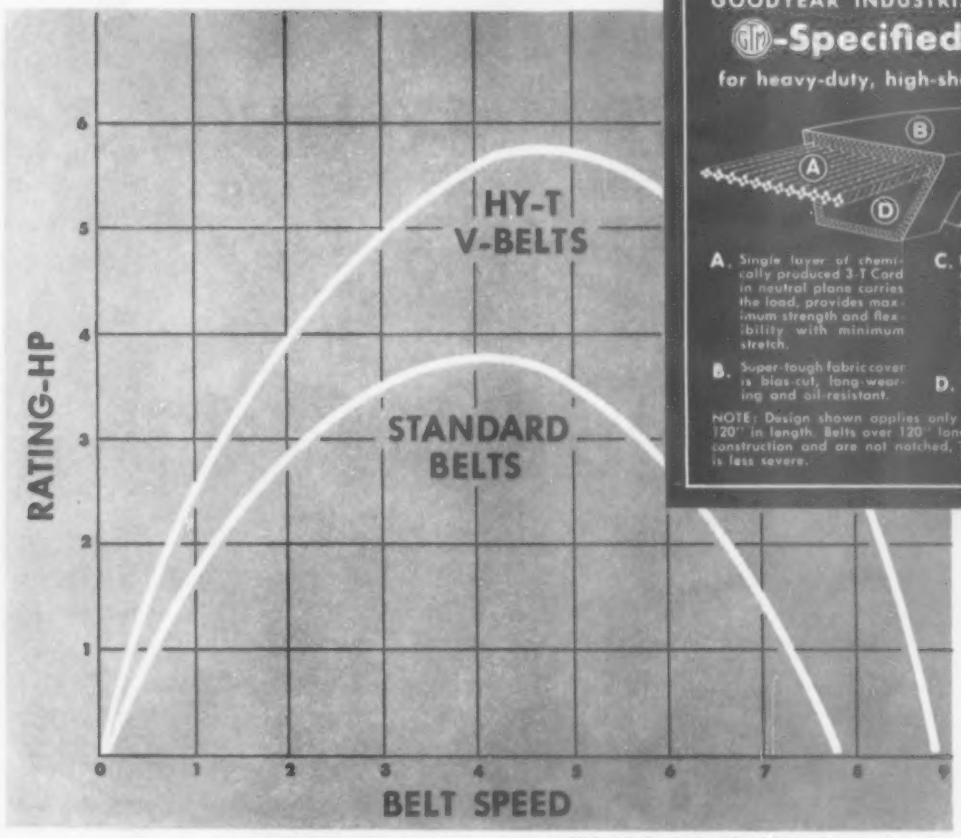
Inset photo shows the large, high-strength 16-inch face herringbone main gear. Large photo: Three Ideco Mud-Master Duplex Slush Pumps undergoing comprehensive factory tests to record data on capacity and pressure variation with both parallel and series compounding.

TRIPLE-TEMPERED (3-T) CORD

makes new, super-V-belt possible



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for heavy-duty, high-shock-load drives
A
B
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3-T CORD makes the new HY-T V-Belts so strong that *seven* of these super-belts will do the work of *ten* standard belts on such tough drives as oil well mud pumps, rock crushers, metal-forming presses, pebble mills, paper and sawmill machinery—at the same cost per rated HP and with net savings on complete drives.

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3-T Cord is the result of an exclusive and patented Goodyear process—a triple-action tempering of special synthetic cord, involving Tension, Temperature and Time, which "sets" the cord at its point of maximum strength and resilience. Using this super-strong cord as the load-carrying member, the G.T.M. built a completely new super-V-belt of completely balanced construction.

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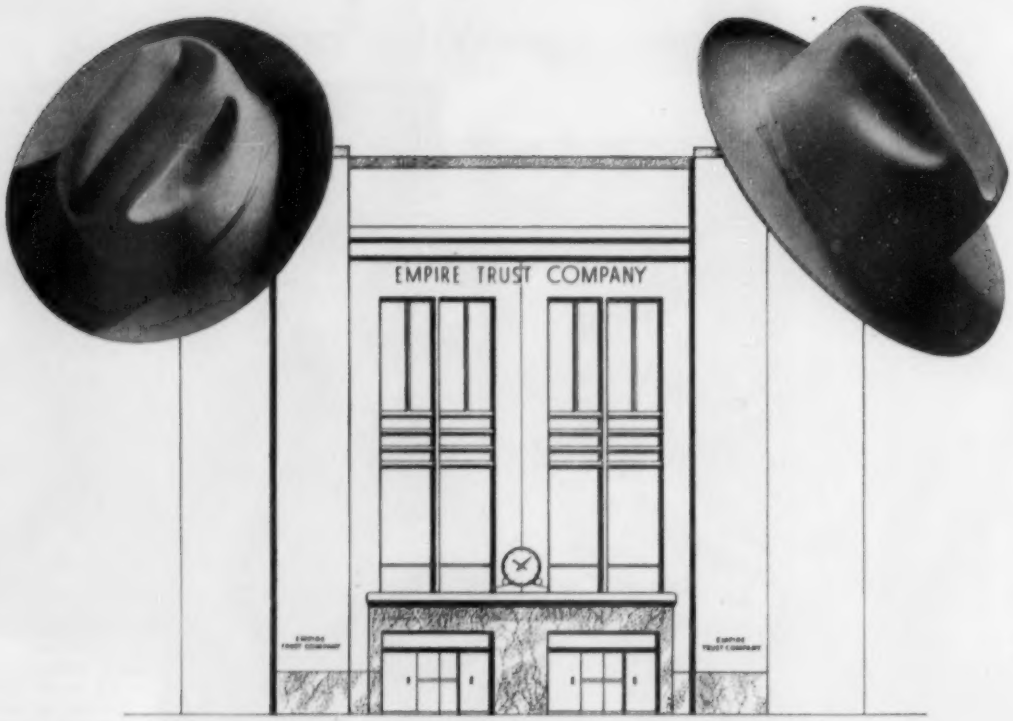

HEADQUARTERS

and a place to hang your hat...

Recognize this building? It's a familiar landmark to our oil industry friends from coast to coast. When they visit New York, you can usually find their hats hanging here.

The next time you're in Manhattan, why don't *you* pay us a call? Very possibly we can help you solve a financing or investment problem that has seemed difficult, or perhaps put you in touch with someone who has the specific knowledge or facilities to meet your needs.

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MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

600 000 000 t

of oil are used in the world every year — a figure that must be seen to be grasped. Imagine a pipe line 48 inches in diameter running 16 times around the earth, or in other words 1,15 million miles long. Our whole way of living and the very maintenance of modern civilization depend on that amount of oil. The struggle to obtain it is a tremendous and continuing one, for consumption keeps climbing without a pause. Mannesmann bears its share in the assault on oil. Only the seamless steel tube made it possible at all to drill thousands of feet down for liquid gold. Mannesmann drilling rigs are fetching up oil all over the world today, and pipe lines of Mannesmann steel tubing carry it away. To the refineries, which are practically one huge system of tubing, we supply pipes, safety valves, and fittings. The universal confidence in Mannesmann products for the petroleum industry is based on experience in oil fields the world over.

Confidence— the reward of decades

MANNESMANN-EXPORT GMBH DUSSELDORF

the new Beechcraft Twin-Bonanza

Here's great news for America's business executives – a six-passenger, twin-engine aircraft that *flies farther* and *flies faster* than any other plane in the six-place field. And it's a *Beechcraft!* The new Beechcraft Model C50 Twin-Bonanza offers busy executives these outstanding – and unmatched – features:

GREATER Power – Two dependable Lycoming power plants, each rated at a full 275 horsepower. This means better short-field and single-engine performance – widens your scope of operations.

GREATER Speed – At only 66.6 per cent of power, and at full gross load, this new Beechcraft cruises at 200 mph. Top speed is 210 mph.

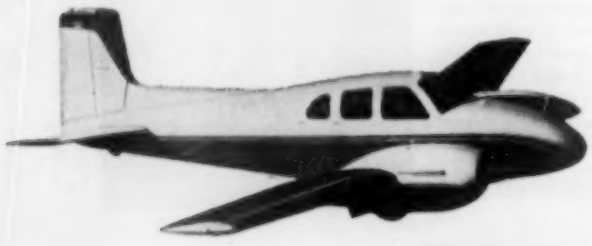
GREATER Range – Chicago to Houston, San Francisco to Denver, Detroit to New Orleans can be nonstop trips in the new Twin-Bonanza with a range up to 1100 miles.

GREATER Comfort – Top-quality materials provide the ultimate in styling in the big, roomy, six-place cabin *now more quiet than ever!* Plus thermostatically controlled heating for in-flight comfort, and a ventilating system for comfort on the ground.

GREATER Ruggedness – The Twin-Bonanza is designed to an 8G flight load safety factor, far in excess of the 5.7G ultimate factor required by Civil Air Regulations for planes of this category. Sixty-five per cent of the weight of the plane is located below and forward of the passengers – a feature made possible by the smart, modern, low-wing design.

BACKED by Experience – Hundreds of Beechcrafts of this basic design are in service throughout the world for business executives and the military services. From the experience of millions of in-flight miles flown by earlier Twin-Bonanzas, Beechcraft has incorporated hundreds of design, equipment, and style changes in this new model. In addition, the Twin-Bonanza incorporates all of the traditional Beechcraft know-how and quality craftsmanship. The Beechcraft Model C50 Twin-Bonanza is proved by the past, designed for the future.

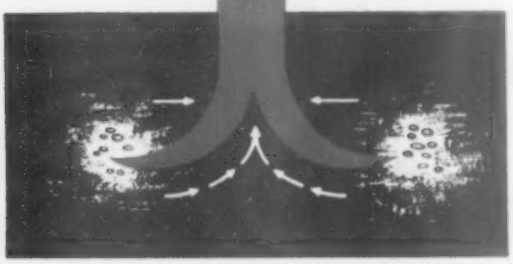
See your Beechcraft distributor, or write Beech Aircraft Corporation, Wichita, Kansas, for information on how this newest addition to "The Air Fleet of American Business" can serve you and your business.



Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

IMPROVED EMULSION BREAKING AGENT GIVES FAST PRODUCTION AID



HALLIBURTON'S NEW

HYFLO

Here's the newest, most effective and fastest acting chemical agent ever developed for boosting production in normal or fractured formations! It's Halliburton's new Hyflo, the improved emulsion breaking compound that removes water and emulsion blocks in oil producing formations and breaks through the viscous emulsions that may be formed with refined fracturing oils.

With only one or two hours of shut-in time, Hyflo treatments have effectively removed emulsions, lowered the surface tension of water and reduced the interfacial tension between oil and water. Surface tension of free waters or water imprisoned in emulsions is reduced more than 50 per cent which lowers the Jamin effect and gives far less resistance to flow when gas and fluid are intermingled in capillary channels. Here are the laboratory results that have been confirmed in widespread field usage:

CONCENTRATION HYFLO	SURFACE TENSION	
	SALT WATER	FRESH WATER
0.025%	31 dynes per cm.	32.7 dynes per cm.
0.0125%	31.8 dynes per cm.	33.6 dynes per cm.

Hyflo's efficiency in reducing interfacial tension has been proved in tests with a 0.1 per cent Hyflo concentration in oil that showed measurements as low as 0.6 dynes per centimeter when in contact with various oil well brines. With all these proved features *plus* more oil solubility for better dispersion – non-corrosive qualities for easier handling – freezing point of –20° F. for all-weather use and storage – and faster, more economical action, you can effect substantial savings in time and material and still get the *most effective* production aid. Get all the Hyflo facts from your local or district office of the Halliburton Oil Well Cementing Company.

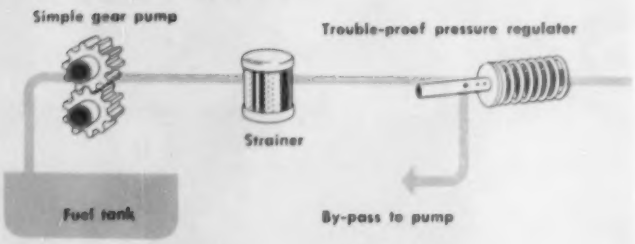
HALLIBURTON

CHEMICAL SERVICES

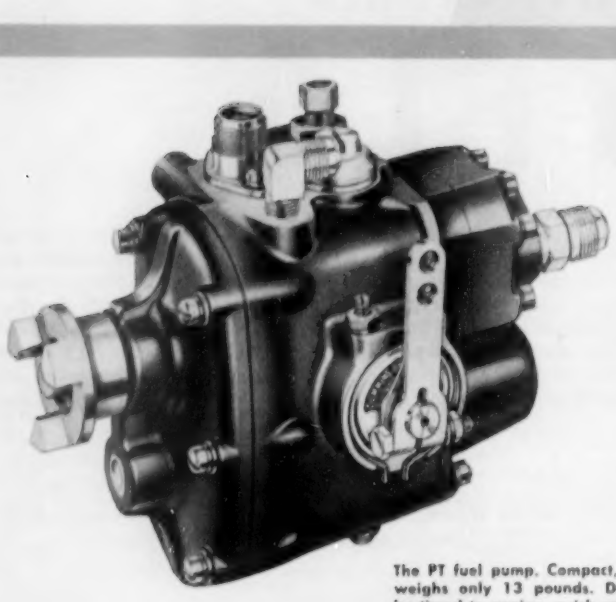
211 SERVICE CENTERS – JUST MINUTES AWAY FROM ANY RIG

Here's the simplest diesel fuel system ever developed!

Simplest pump and fuel control arrangement



Cummins new PT *fuel system...*



The PT fuel pump. Compact, easy to handle, weighs only 13 pounds. Does not have to be timed to engine, quick and easy to install.

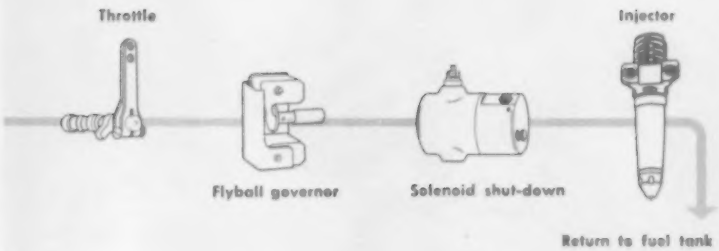
The PT injector utilizes the exclusive Cummins principle of fuel injection which has set the highest standards of performance and economy for more than 20 years.

THE revolutionary new PT fuel system, now standard on all Cummins Diesels, has fewer and far simpler parts than carburetor and ignition systems or ordinary diesel fuel systems. It is easy to understand, simple to work with, can be serviced by any mechanic. No longer any need for fuel system specialists! The PT fuel system has undergone two years of field testing and millions of operating miles under every conceivable condition. Its dependability record is phenomenal. Operators report even less fuel consumption than with earlier Cummins fuel systems and far less cost of maintenance. The PT fuel system can be installed on any Cummins Diesel built since 1932.

Cummins

leader in lightweight high speed diesel power

Cummins Diesels (60 to 600 h.p.) are built for and used by original equipment manufacturers in highway trucks, off-highway trucks, power shovels, scraper units, buses, motor graders, logging yarders and loaders, oil well drilling rigs, electric power generators, irrigation systems, work boats, and pleasure craft.



PT advantages over gasoline systems:

No contact points to adjust
No condenser to replace
No spark coil to short
No wiring harness to short
No spark plugs
No vapor-lock problems
No flooding
No choking or priming
No needle valves to clog
No butterfly valve
No float level to maintain
No float valve to stick

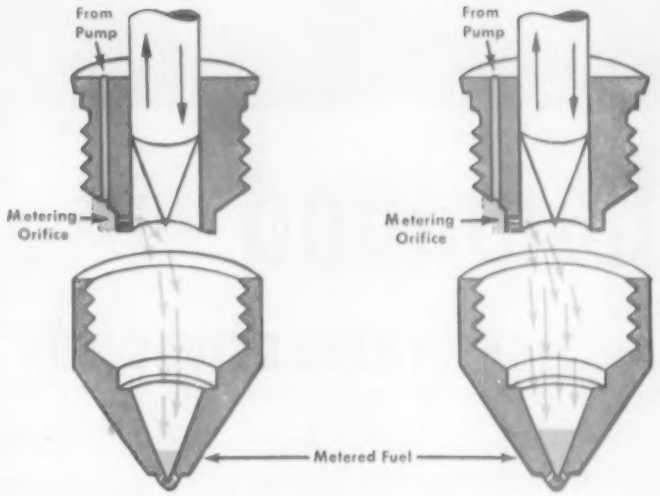
PT advantages over ordinary diesel systems:

No fuel rack adjustments
No check valves
No needle valves
No helixes
No distributor discs
No metering pumps
No high-pressure fuel lines
No fuel pump timing

. . . simpler to work with than gasoline carburetion and ignition

Simplest Fuel Metering Device

The principle is simply that the amount of fuel flowing through a fixed orifice varies according to the amount of pressure on the fuel. Pressure is controlled by the throttle on the PT pump. Fuel flow through orifice is cut off as injector plunger, actuated by engine camshaft, moves down to inject fuel.



When engine is under partial load, fuel pressure is low, and only a small amount of fuel passes through orifice into injector cup.

When engine is under full load, fuel pressure is increased, and greater amount of fuel passes through orifice into injector cup.

Mail this today, and get more PT facts!

CUMMINS ENGINE COMPANY, INC. Dept. OG-12
Columbus, Indiana

Please send me free illustrated folder, "Cummins PT Fuel System."

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

CUMMINS

Photo by Dwight Boyer, shown through courtesy of Toledo Blade and with permission of Gulf Oil Corp.

Raymond BUILDS

MORE FOUNDATIONS FOR GULF OIL

THE GULF OIL CORPORATION recently used Raymond for the foundation work of a multimillion-dollar expansion program at its Toledo Refinery. In just 127 working days Raymond completed its part in the project, driving 115,000 linear feet of pipe step-taper and composite piles—another example of how Raymond efficiency saves time . . . and money.

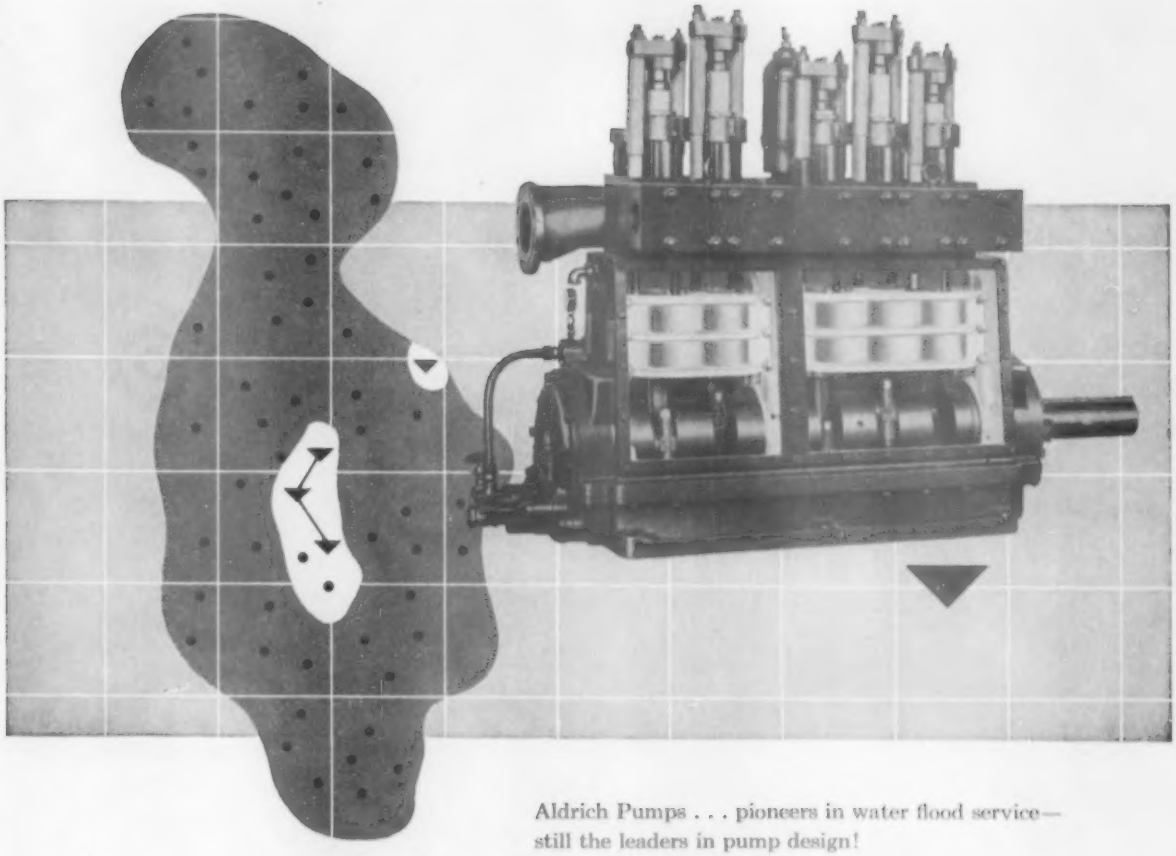
RAYMOND'S DOMESTIC SERVICES
Soil Investigations . . . Foundation Construction
Harbor and Waterfront Improvements
Prestressed Concrete Construction . . . Cement-mortar Lining of Water, Oil and Gas Pipelines, In Place.

RAYMOND'S SERVICE ABROAD
In addition to the above, all types of General Construction.

Raymond
CONCRETE PILE CO.

BRANCH OFFICES
in principal cities of the United States, Central and South America.

140 CEDAR STREET • NEW YORK 6, N. Y.



Get peak water flooding efficiency with ALDRICH field-proven Direct Flow pumps

Aldrich Pumps . . . pioneers in water flood service—still the leaders in pump design!

- *high speed*—greater volume from more compact pumps.
- *low maintenance costs*—KOSMOS Porcelain Plungers and completely sectionalized fluid-ends reduce maintenance, material costs and down time.
- *complete range of sizes*—3″ Triplex, 5″ and 6″ Triplex and Multiplex units permit optimum combinations of pumps with maximum interchangeability of parts.
- *for corrosive service*—fluid-ends available in stainless steel or aluminum bronze.

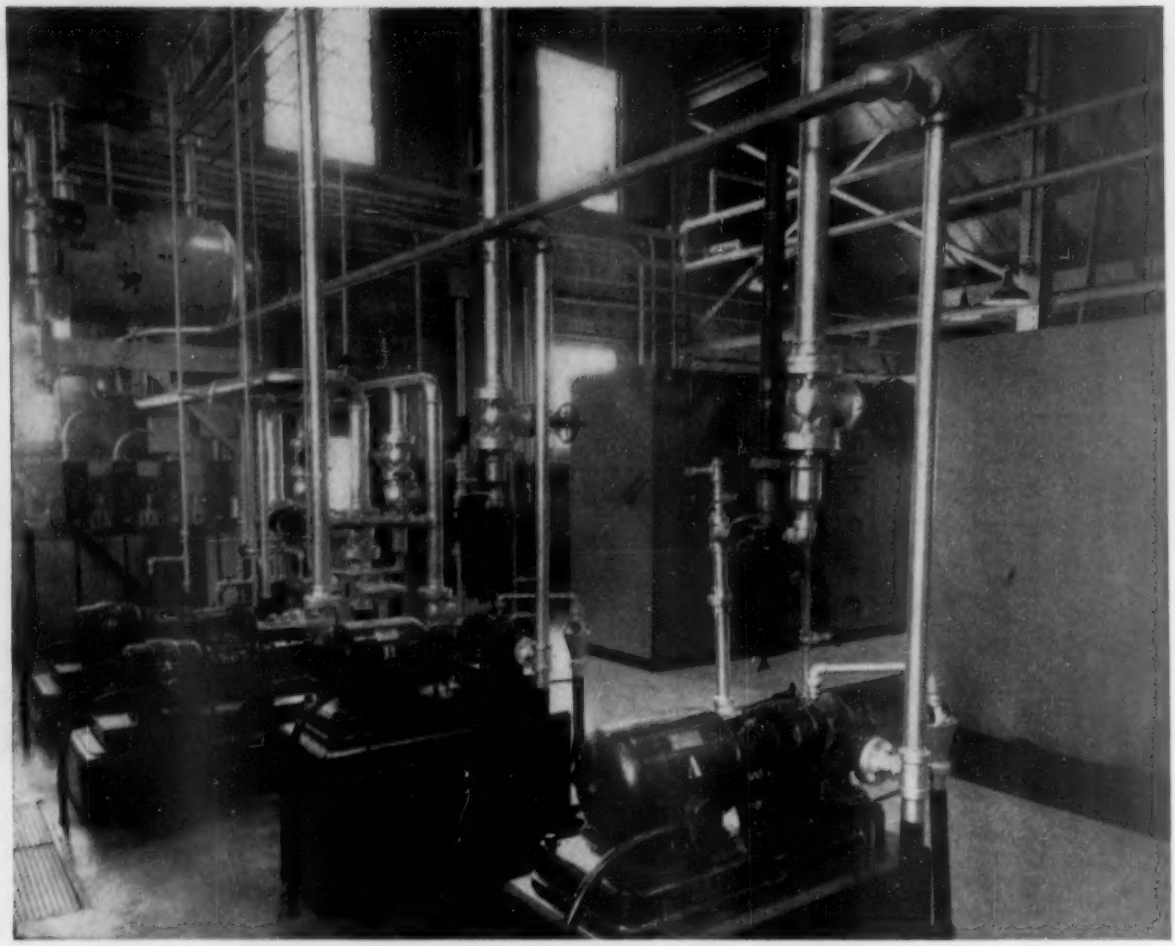
the ALDRICH *pump company*

. . . Originators of the Direct Flow Pump

9 GORDON STREET • ALLENTOWN, PENNSYLVANIA

Representatives: Bushnell Controls & Equipment Co., Inc., 5137 West Jefferson Blvd., Los Angeles 16, Calif. • Cross Pump & Equipment Co., P.O. Box 889, Charleston 23, W. Va. • Lloyd T. Gibbs Co., 1021 Petroleum Bldg., Tulsa 3, Okla. • Lloyd-Smith Co., Inc., Bradford, Pa. • Walter Norris Engineering Co., Civic Opera Bldg., 20 North Wacker Drive, Chicago 6, Ill. • Power Specialty Co., P.O. Box 6365, 2000 Kipling Street, Houston 6, Texas; The Suburban Bldg., Room 204, 5526 Dyer Street, Dallas 6, Texas • B. G. Harmon Service & Equipment Co., P.O. Box 309 (Farm Bureau Bldg.), Carmi, Ill. • Stearns-Roger Manufacturing Co., 1720 California Street, Denver 2, Colo. • Export: Petroleum Machinery Corporation, 30 Rockefeller Plaza, New York 20, N. Y.

Direct Flow Spare Parts Stock—at Carmi, Ill., Houston, Los Angeles, Odessa, and Tulsa



Two V-12 Vacuum Pumps, 1750 r.p.m., rated 47 c.f.m. referred to 24-inch vacuum intake, handling non-condensibles from turbo-generators at 5000 ft. elevation.

another

Fuller ROTARY VACUUM PUMP INSTALLATION

Those who use Fuller Rotaries for gas-gathering and boosting service also find other applications for them.

In the Elk Basin Unit Pressure Maintenance Plant, operated by Stanolind Oil and Gas Company in Park county, Wyoming, Fuller Rotary Compressors are used to supply pulsation-free air for plant services. Other Fuller Rotaries, as illustrated above, handle non-condensibles from turbo-generators.

Fuller Rotary Compressors serve in every industry where reliable, economical, low-maintenance operation is important in capacities to 3300 c.f.m. and pressures up to 125-lb. per square inch. Write today for complete information. Fuller Company, Catasauqua, Pennsylvania.

Fuller... high efficiency, vane-type rotary compressors for gas gathering, gas boosting, repressuring flare gas, refrigeration, engine starting, pneumatic power, pneumatic controls, general plant air, air lifts, and vacuum service.

C-242
2249

The "local" supply service that never stops growing!

There are six more areas in the oil country that now have their own local National Supply stores—Las Morochas, Venezuela; Lake Charles, Louisiana; Pearsall, Texas; Virden, Manitoba, and Drayton Valley, Alberta, Canada; and Worland, Wyoming.

These recent additions bring the total in this international network to a new high of 124 stores—covering virtually every spot of oil country between Northern Canada and Venezuela.

However, as important as the actual number of stores, is the particular standard quality of service that each National Supply store gives it own area. Completely local in operation, the store is staffed by NSCO men who intimately concern themselves with every local drilling and production project—stocking parts and equipment to meet local specific needs quickly and completely—and ready to provide prompt service whenever it is needed.

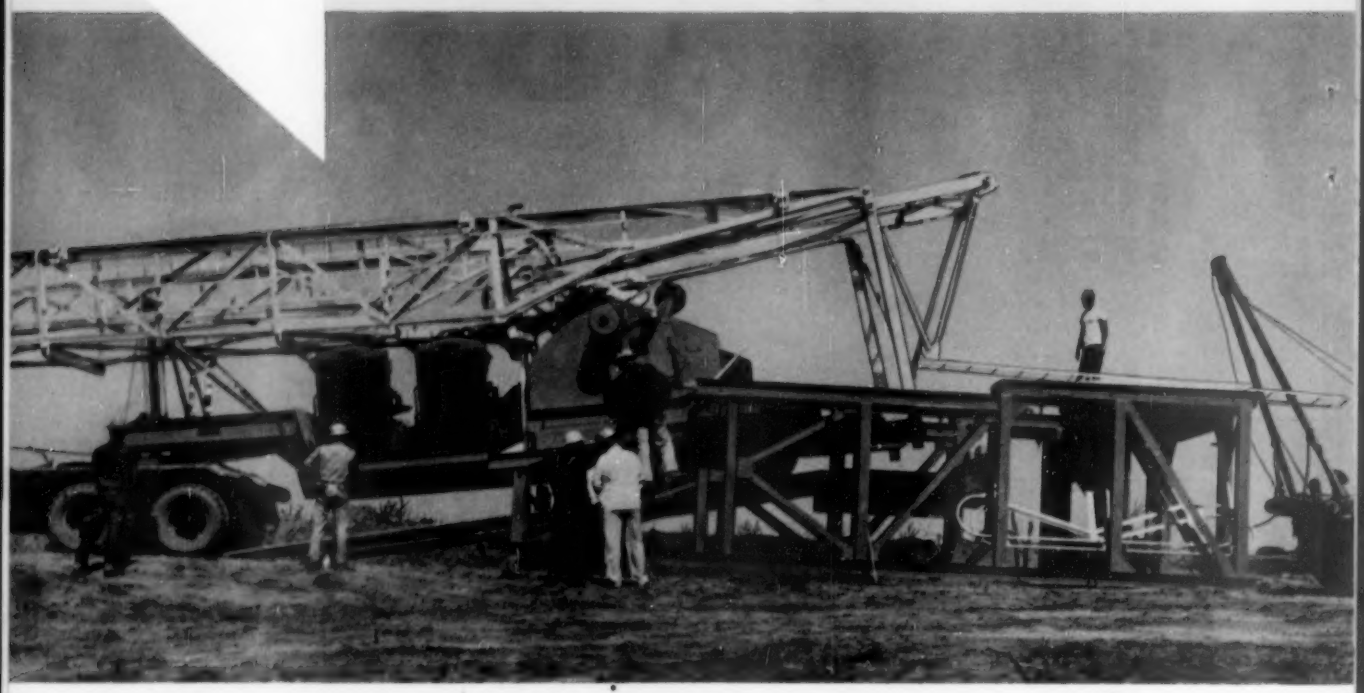
Your continued preference for this brand of supply service is one important reason why there are so many National Supply stores today. Making this service available, no matter where you are in oil country, is another way we continually strive to *always* serve you better!

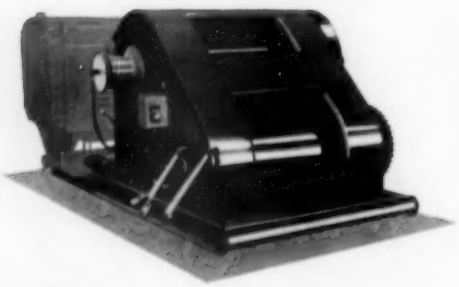
First in quality...
First in supply service
in oil country everywhere

NSCO NATIONAL BLUE PRODUCTS

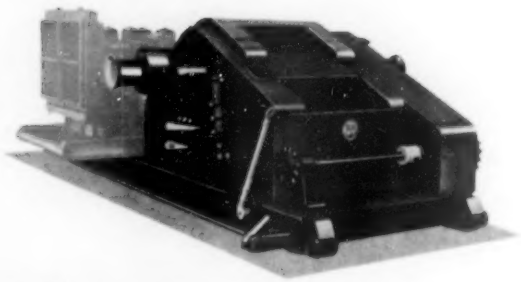
THE
NATIONAL SUPPLY
COMPANY
PITTSBURGH 30, PENNSYLVANIA

Users report: "Minimum downtime...fast operations...new versatility in drilling and workover jobs..."

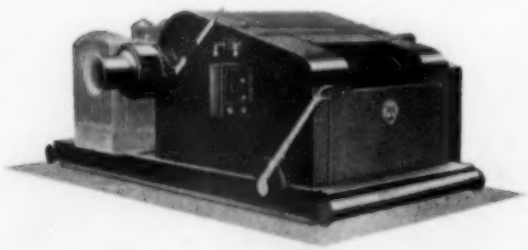




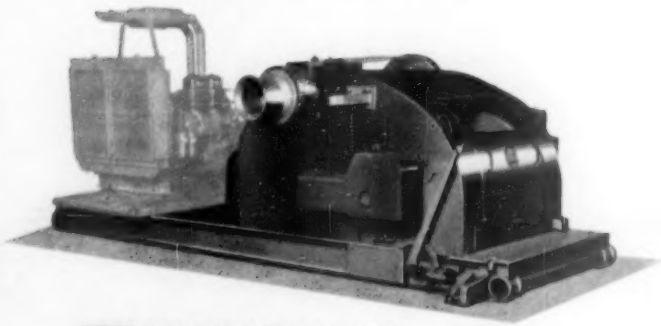
IDEAL T-8 AND T-8-S RIGS RATED AT 80 H. P.



IDEAL T-20 AND T-20-S RIGS RATED AT 200 H. P.



IDEAL T-12 AND T-12-S RIGS RATED AT 120 H. P.



IDEAL T-32 RIGS RATED AT 320 H. P.

These truck and trailer mounted IDEAL® rigs are setting new operating records, provide "big rig" performance!

National Supply's line of versatile, lightweight Ideal Rigs has been specifically designed for drilling and workover jobs. And in the field, their operation shows the same experienced design, quality construction and built-in "extra" performance that you expect from the larger Ideal Rigs.

For complete job versatility, these Ideal Rigs are available as skid-mounted units or as complete factory assembled truck or trailer mounted units. In either version, they are built for exceptionally fast rig-ups and tear-downs. Because you can move them quickly, downtime between jobs is kept to a minimum.

For "plus" performance, these Ideal Rigs feature roller-bearing mounted free-running drums, air controls, air-actuated clutches and fully enclosed cascade lubrication for all chains and sprockets. And because these Rigs utilize torque converter drive, you get shock-free operation, and an infinite number of running speeds.

Complete details on the Ideal "mobile mounted" Rigs described here are available from the National Supply Representative or Store in your area. Be sure to ask for new descriptive bulletins on the Ideal T-8, T-12, T-20 or T-32 today.

IDEAL® RIGS CAN BE "MOBILE MOUNTED" TO SUIT *YOUR* REQUIREMENTS

Ideal T-20 in road position, equipped with 95 ft. mast

Rotary drive side, Ideal T-32 Rig with 96 ft. mast

Trailer-mounted T-12 & substructure

Trailer-mounted T-32 in "ready to drill" position

First in quality...
First in supply service
in oil country everywhere

NATIONAL BLUE PRODUCTS

THE NATIONAL SUPPLY COMPANY
PITTSBURGH 30, PENNSYLVANIA

DIVISION OFFICES: Denver; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

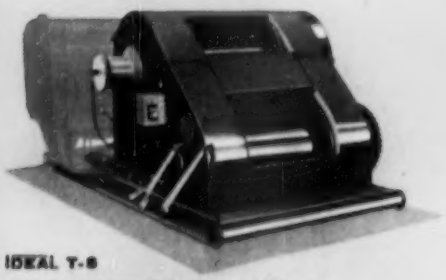
CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta

EXPORT: 600 Fifth Avenue, New York 20, N. Y., U. S. A.; River Plate House, 12 South Place, London E. C. 2

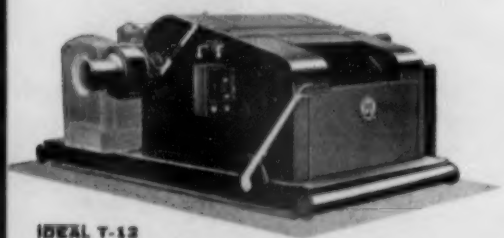
see the next page for information on IDEAL® hoists for well servicing

New Speed

in every type of well-servicing operation...



IDEAL T-8
AND **T-8-S** HOISTS RATED AT 80 H. P.
NORMAL SERVICING RANGE: 2000-4000 FT.



IDEAL T-12
AND **T-12-S** HOISTS RATED AT 120 H. P.
NORMAL SERVICING RANGE: 3000-6000 FT.

IDEAL® HOISTS

Tailor-made for the versatile performance needed in well-pulling and well-servicing operations, Ideal Hoists are exceptionally compact and lightweight . . . especially suited for truck and trailer mounting.

Constructed as single units, draw works and engine are mounted on a heavy steel H-beam skid frame. For maximum convenience in transportation or truck mounting, overall dimensions of Ideal Hoists conform to all highway width limits.

Operating features in these Ideal hoists parallel the quality features found in all Ideal Rigs. Besides free-running drums, optional sand reels, air-operated controls and clutches, these Ideal Hoists utilize torque converter drive for smooth operation, a great variety of running speeds.

Get complete details on these highly versatile Ideal Hoists from the National Supply Representative or Store in your area soon.

First in quality...
First in supply service
in oil country everywhere

NATIONAL BLUE PRODUCTS

THE NATIONAL SUPPLY COMPANY

PITTSBURGH 30, PENNSYLVANIA

DIVISION OFFICES: Denver; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta

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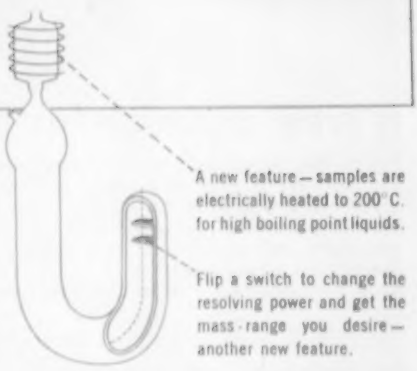
NATIONAL OIL FIELD MACHINERY AND EQUIPMENT · SPANG STEEL PIPE · SUPERIOR & ATLAS ENGINES

Now Consolidated offers

greater speed, accuracy, versatility

in the new improved Model 21-103C

Analytical Mass Spectrometer



A new feature—samples are electrically heated to 200°C. for high boiling point liquids.

Flip a switch to change the resolving power and get the mass-range you desire—another new feature.

Year after year CEC's line of Mass Spectrometers maintain their position of world leadership through a program of continuous improvement and refinement. CEC's Analytical Mass Spectrometer, for 12 years the accepted standard instrument for fundamental research in petroleum processing, refinery control laboratories, chemical manufacturing, molecular-structure studies, biochemical and related applications, now incorporates two major improvements.

Retaining all its proven features such as precisely regulated electronic circuitry, high speed recording, automatic scanning, and indexing of mass-scale on the spectra, the new Model 21-103C features an accessory oven for electrically controlled sample heating, and instantaneous change in resolving power from the low mass-range of 150 to a high mass-range of 700 at the flick of a control panel switch. These two refinements greatly increase the flexibility of the instrument and adapt it to gas and light liquids or high molecular weight liquids or solids.

The new improved Model 21-103C Analytical Mass Spectrometer is now ready to maintain Consolidated's tradition of bringing the highest standards of speed, accuracy and versatility to analytical measurement and research applications throughout industry and the sciences.

For complete details send for Bulletin CEC 1800C-X6.

Consolidated Engineering
CORPORATION
300 North Sierra Madre Villa, Pasadena 15, California

Sales and Service through **CEC INSTRUMENTS, INC.,** *a subsidiary with offices in: Albuquerque, Atlanta, Buffalo, Chicago, Dallas, Detroit, New York, Pasadena, Philadelphia, Seattle, Washington, D.C.*

3 Cooling

PHILLIE GEAR

a type and size for every requirement

The growing use of larger fans in cooling tower service brought the need for a drive that would best meet heavier load conditions. Philadelphia, having long been a leading manufacturer of conventional worm gear cooling tower drives, thoroughly understood this problem and presents a complete line of right angle Speed Reducers . . . Worm Gear, Spiral Bevel, and Helical Spiral Bevel. All three types are specifically manufactured for cooling tower fan drives. Housings are made of high quality close-grained grey iron and are proportioned to withstand the severe stresses encountered during operation. All shafts mounted in anti-friction bearings to assure high efficiency, correct center distance and proper shaft alignment. Bearings provide generous thrust and radial capacity . . . all these features give long, quiet service life.

worm gear

HP range—3 thru 30 HP @ 1750 rpm input.

Ratio range—3⅛ to 83¼.

Efficiency—up to 95% depending on ratio.

Application—Best economy in range up to 25 HP. Quiet operation, suitable for input speeds up to 2000 rpm.

spiral bevel

HP range—15 thru 75 HP @ 1750 rpm input.

Ratio range—3½ to 9⅕:1.

Efficiency—97-98%.

Application—Best economy above 15 HP. Advantages of high efficiency, small heat loss. Suitable for input speeds up to 2500 rpm.

helical spiral bevel

HP range—20 thru 115 HP @ 1750 rpm input.

Ratio range—6⅔ to 15:1.

Efficiency—95-96%.

Application—Best economy when used on drives greater than 25 HP and when required ratios exceed those possible with single reduction spiral bevel. This unit also best suited for turbine applications up to 4000 rpm input.

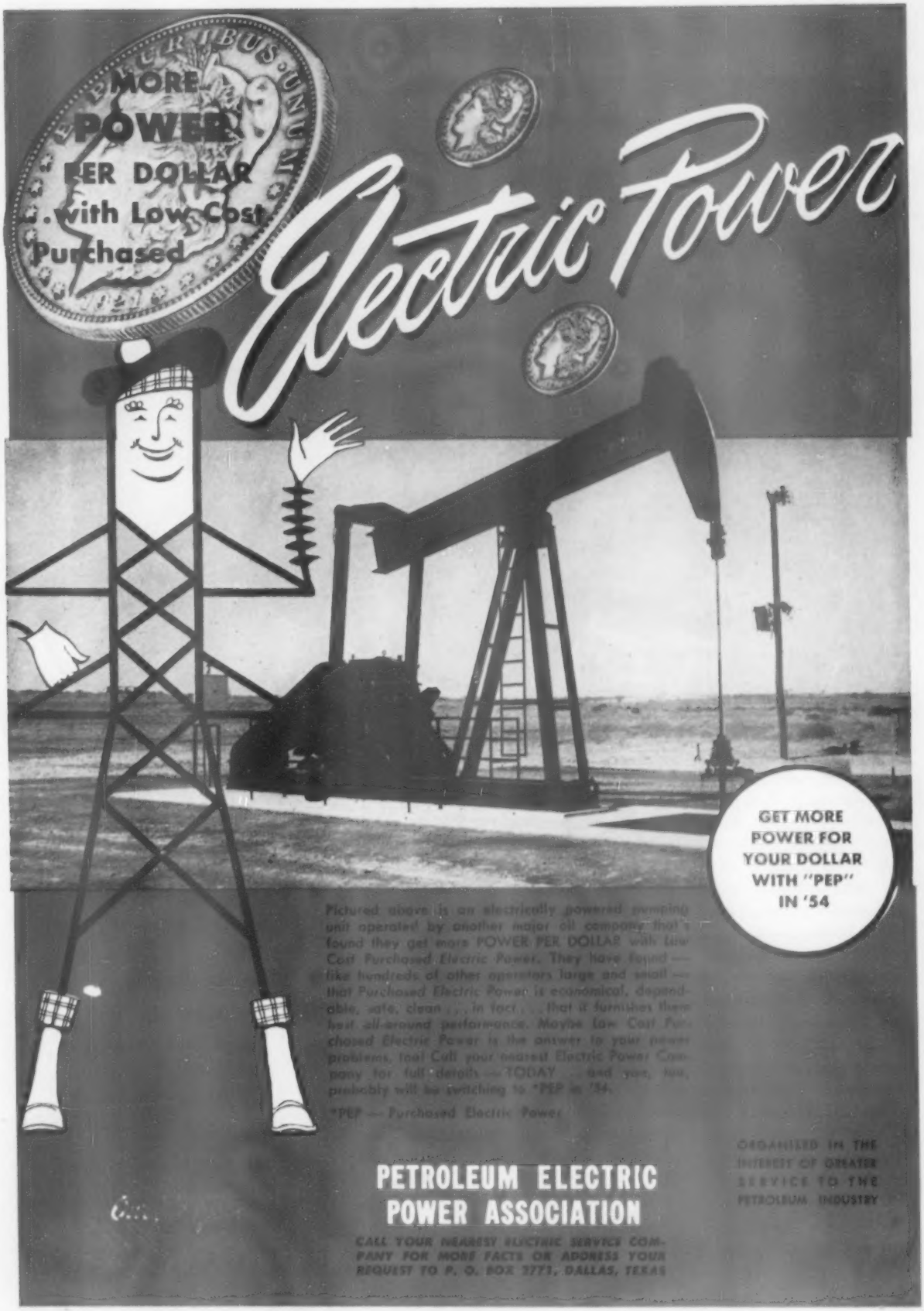
Write for our new catalog CT-53 illustrating all types of Cooling Tower gear drives and their applications.

PHILADELPHIA GEAR WORKS, INC.

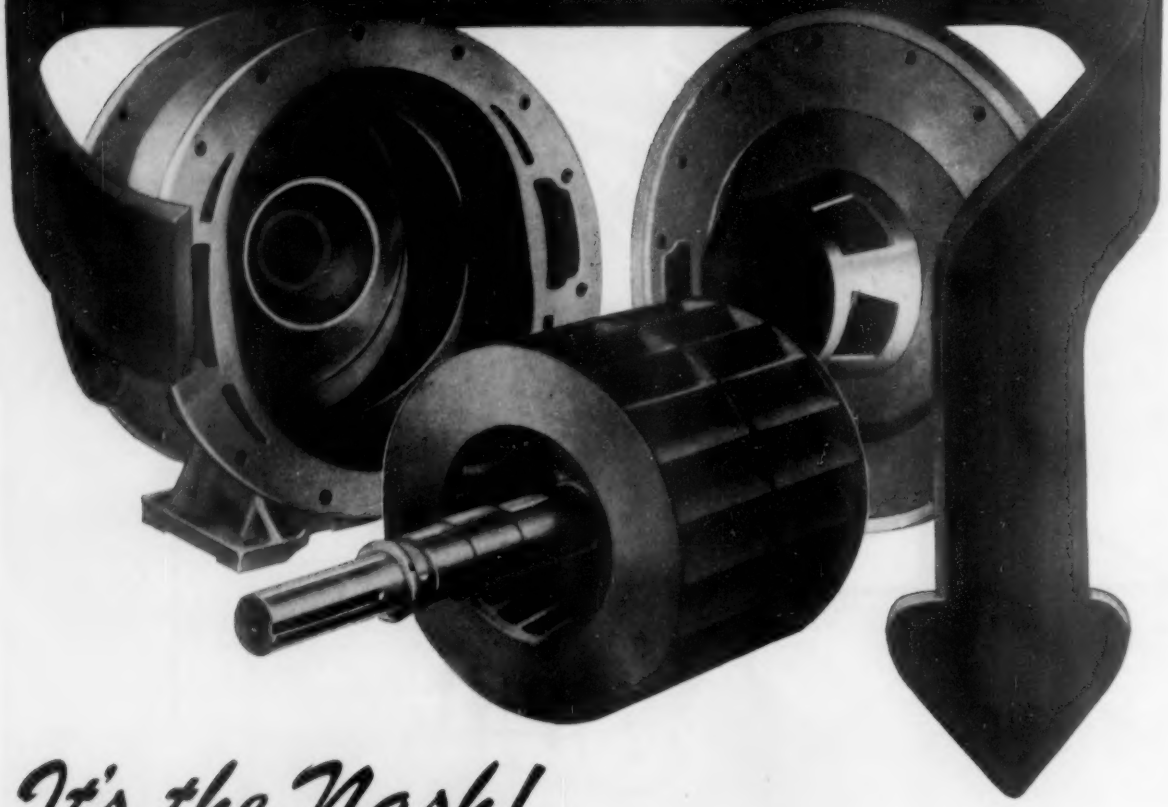
ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.
Virginia Gear & Machine Corp., Lynchburg, Va.

Industrial Gears & Speed Reducers

LimiTorque Valve Controls


MORE
POWER
PER DOLLAR
...with Low Cost
Purchased
Electric Power
GET MORE
POWER FOR
YOUR DOLLAR
WITH "PEP"
IN '54
Pictured above is an electrically powered pumping unit operated by another major oil company that's found they get more POWER PER DOLLAR with low Cost Purchased Electric Power. They have found — like hundreds of other operators large and small — that Purchased Electric Power is economical, dependable, safe, clean . . . in fact . . . that it furnishes them best all-around performance. Maybe Low Cost Purchased Electric Power is the answer to your power problems, too! Call your nearest Electric Power Company for full details — TODAY . . . and you, too, probably will be switching to "PEP" in '54.
"PEP — Purchased Electric Power
PETROLEUM ELECTRIC
POWER ASSOCIATION
CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS OR ADDRESS YOUR REQUEST TO P. O. BOX 2773, DALLAS, TEXAS
ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

This Simple Compressor Meets the Complex Needs of a Changing Petroleum Industry



It's the Nash!

Here is a compressor presenting advantages found in no other device. Nash Compressors have only one moving part, rotating without metallic contact with the pump casing. No internal lubrication is required. Yet they produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure.

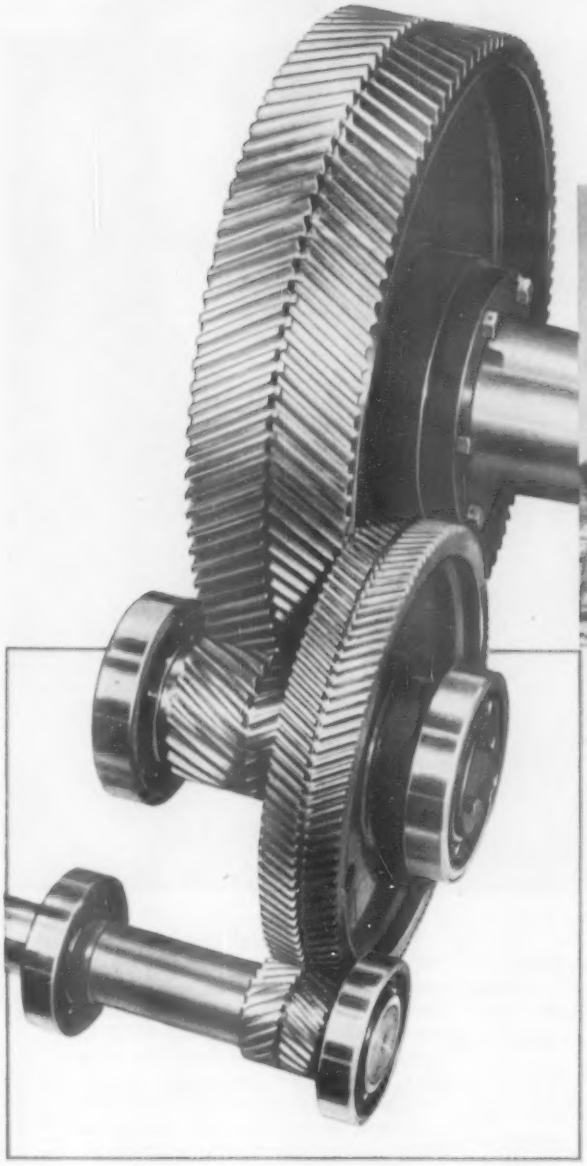
There are no valves, gears, pistons, sliding vanes, or other complicated wearing parts in a Nash. Compression is secured by an entirely different principle of operation. Because of this, gas pumping problems difficult with ordinary pumps are often easily handled by the Nash. For example, Nash Pumps are standard equipment in the Synthetic Rubber Industry, where they have met the needs of new and difficult processes.

Nash Compressors are compact and save space. They run without vibration, and compression is without pulsation. They maintain original performance over long periods. Service is assured by a nationwide net-work of Engineering Service offices. Instructive bulletin shows how they operate. Write for it.

- One moving part.
- No internal wearing parts.
- No valves, pistons, or sliding vanes.
- No internal lubrication.
- Low maintenance.
- Slugs of liquid entering pump do no harm.
- Non-pulsating pressure.
- Saves floor space.
- 75 pounds in a single stage.

NASH ENGINEERING COMPANY
311 WILSON, SO. NORWALK, CONN.

FLOATING ON HYATTS!



This is a job for straight roller bearings, and EMSCO relies on HYATTS!

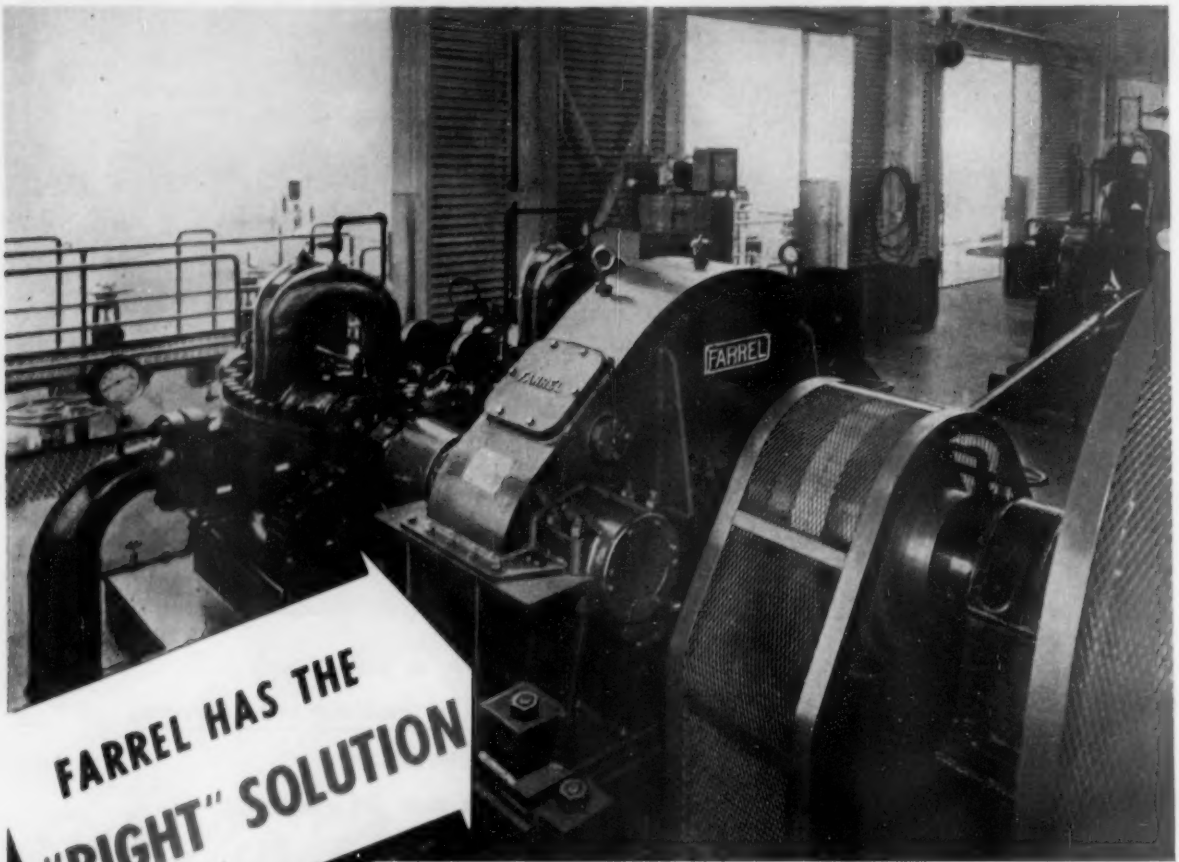
Take a good look at these herringbone gears—and at the four bearings supporting the two smaller shafts. These particular herringbones operate in the gear box of EMSCO's newest pumping unit, and the bearings are *Hyatt Hy-Loads!* For oilmen, this is a combination that means longer bearing life and lower maintenance costs, because only *straight radial bearings* permit these gears to locate themselves for most efficient operation. And when the application calls for radial-type bearings, EMSCO engineers specify Hyatts. Hyatts offer the proven advantages of easy assembly, simple maintenance, complete interchangeability of parts, and longer life. Insist on Hyatt Bearings for *your* oil-field equipment.

HYATT ROLLER BEARINGS

STRAIGHT BARREL TAPER

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

USUAL OR UNUSUAL SPEED INCREASING PROBLEM



FARREL HAS THE "RIGHT" SOLUTION

Normally you can select the "right" speed increaser for your particular installation from Farrel's standard line of 49 sizes, with ratios from 1:1 to 12:1. Units using two sets of gears are supplied for higher ratios—ratio range from 12:1 to 40:1.

If your installation is unusual like the one in the photograph, Farrel will still supply the ideal speed increaser for the job. In the case above, a two-pinion unit delivers 300 HP to each of two pumps from a single 600 HP engine. It steps up the engine speed of 400 RPM to pump speed of 3553 RPM.

How "right" Farrel speed increasers are for any pipeline pumping service can be measured by their performance record over the years. Of the hundreds and hundreds installed since 1932, all are still in operation. And, in addition, service calls have been rare, although many of these units have been operating under the most adverse conditions—continuous heavy-duty service, dust, rain, sandstorms, severe heat and intense cold.

Farrel engineers will be glad to help you choose the "right" gear unit for your high speed application.

Write for information.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Akron, Detroit, Chicago, Memphis, Minneapolis, Fayetteville (N. C.), Los Angeles, Salt Lake City, New Orleans

OIL FIELD REPRESENTATIVES:
Hercules-Lupfer Engine Sales Co., 124 N. Boston St., Tulsa 1, Okla.
V. W. Osborne, 860-A M&M Building, Houston 2, Texas

Farrel-Birmingham ®

PB-970

"You see Powell Valves everywhere. Naturally, since . . .

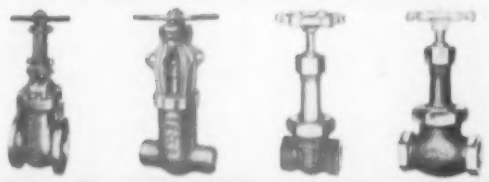
. . . engineers specify Powell Valves because they're dependable and economical. Engineers also know Powell has a *complete line* of valves."

FAMOUS
for dependable flow control

Powell Valves have a record of dependable flow control since 1846. And Powell can supply just the valve you need—for Powell probably makes more kinds of valves and has solved more valve problems than any other organization in the world.

Available through distributors in principal cities. Made ⅛" to 30" and for 125 pounds to 2500 pounds W.S.P. Bronze, iron, steel and corrosion resistant metals and alloys. On problems, write direct to The Wm. Powell Company, Cincinnati 22, Ohio.

CONTROLS FOR THE LIFE LINES OF INDUSTRY

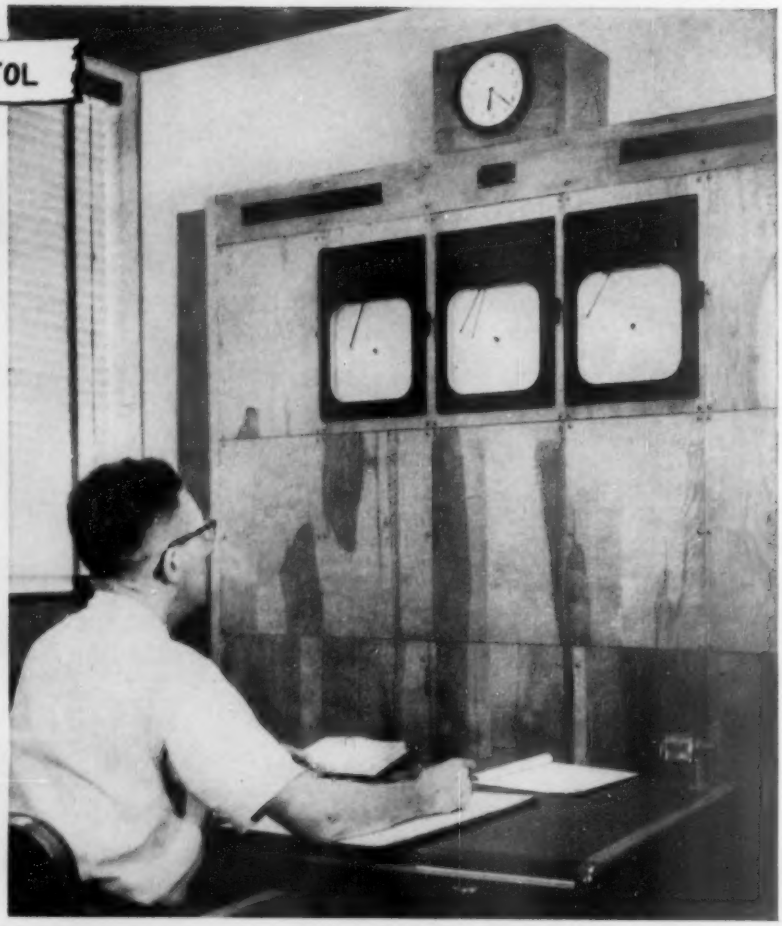


Powell Valves

108th year

WHAT'S NEW AT BRISTOL

Bristol helps him watch 1000 miles of pipeline



THREE BRISTOL METAMETER* RECEIVERS in the Houston, Texas, office of the Trunkline Gas Company, show the static and differential pressure of gas at Bourbon, Illinois, over 1000 miles away, Oretta, Louisiana, and Edith, Louisiana. Readings are sent by microwave from these points to the Bristol receivers, where even the slightest variation in flow or pressure is recorded.

*Reg. U. S. Pat. Off.

STRETCHING FROM TEXAS INTO ILLINOIS, the Trunkline Gas Company line crosses Louisiana, Arkansas, Tennessee and Kentucky. Microwave stations all along the way speed pressure readings to the Metameter Telemeters at the main office in Houston. Because they wanted the finest, Trunkline Gas selected Bristol, the acknowledged leader in telemetering, to supply the necessary recording equipment.

Find out how Bristol's 60 years of instrument experience can help you, too. Write for Bulletin M-1710 to The Bristol Company, 120 Bristol Road, Waterbury, Conn.

BRISTOL

LOOK FOR OUTSTANDING NEW DEVELOPMENTS FROM BRISTOL

THE DEPENDABLE GUIDEPOST OF INDUSTRY

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

LUFKIN

2 CYLINDER—2 CYCLE HORIZONTAL GAS ENGINES . . .

2 ENGINES IN 1

Two CYLINDERS

- FOR SMOOTHER OPERATION
  Two power strokes per revolution reduces shock and vibration.
- FOR LOWER STARTING TORQUE
  Requires less power for starting.
- FOR GREATER OPERATING SPEED RANGE.

COMBINES THE ADVANTAGES OF SLOW SPEED FOR RUGGEDNESS AND LONG LIFE WITH THE SMOOTHER POWER DELIVERY OF EXTRA CYLINDERS.

Only LUFKIN

MANUFACTURES OILFIELD ENGINES IN THE SOUTHWEST AREA. CONSEQUENTLY OUR CUSTOMERS ARE ASSURED OF RAPID SERVICE AND OVERNIGHT SUPPLY OF PARTS.

1 2

Lufkin **FOUNDRY & MACHINE COMPANY**

LUFKIN, TEXAS

Branch Sales and Service: Houston • Dallas • New York • Tulsa • Los Angeles • Seminole • Oklahoma City • Corpus Christi • Odessa
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Brookhaven, Mississippi • El Dorado, Arkansas

Lufkin equipment in Canada is handled by THE LUFKIN MACHINE CO., LTD., 14321 108th Avenue, EDMONTON, ALBERTA, CANADA

JONES SUCKER RODS

BEST IN THE FIELD

Modern machines, new facilities and technical skill—backed by specialized engineering and metallurgical experience—tied closely to field operations. In capsule form, this is why Jones quality and service are always maintained at the peak level.

PESA

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

PIONEERS IN PETROLEUM PROGRESS

THE S. M. JONES COMPANY

Division of Buffalo-Eclipse Corporation

General Office and Factory: TOLEDO, OHIO

Sales Office: Kennedy Building, Tulsa, Okla.

Export Sales Office: Buffalo International Corp. 50 Church Street, N. Y. C.

LOOK FOR THE GREEN RODS

Our Face is Red!

We never dreamed... that the oil industry would respond so enthusiastically to our introduction of the "Royal Scintillator." We were caught with our production down. We not only did not have enough instruments to supply the demand, we didn't even have enough catalogs. We apologize and wish to assure our customers that we are now in a position to give prompt service.

Not everyone agrees that the radiation survey technique is a proven method of oil field exploration. We agree that not enough data is available as yet, however, there is a growing body of opinion which holds that this is a valuable technique. Recent very encouraging results support this opinion.

We cannot guarantee that the Model 118 Royal Scintillator will locate oil, but we can guarantee that the Royal is the best instrument made for investigating the radiation pattern existing around oil fields. It is also the best instrument made for uranium prospecting, and its use for this purpose should not be overlooked by oil geologists.

Contact your nearest dealer or write direct for free pamphlet on "The Principles of Oil Field Detection with Scintillation Counters" and complete catalog on Geiger Counters and Scintillators.

PRECISION RADIATION INSTRUMENTS, INC.
2235 IP S. LA BREA AVE., LOS ANGELES 16, CALIFORNIA
Name _____ Title _____
Company _____
Address _____ City _____ State _____

PRECISION RADIATION INSTRUMENTS, INC.
World's Largest Manufacturers of Portable Radiation Instruments

Wherever hard-driving, cost and profit-minded men go to work . . . there you'll find massive, powerful FWDs shouldering their way through the job . . . getting it done quickly, safely, efficiently—beating work-schedules that put ordinary trucks into the shop for repairs.

For FWD is *"More Than Just a Truck!"* This basic unit of heavy-duty driving power opens up a whole new concept in on-the-job achievement . . . custom-engineered to out-perform mass produced, mass marketed trucks on the basis of power, dependability and economy of operation.

FWD's *Advanced Math-Matic Design* correctly proportions power to weight on front and rear axles, making every pound of load help haul itself! Each wheel's cargo only makes it grip harder, turning every ounce of power into greater controllable traction and steering safety.

- Higher power-weight ratio than any ordinary truck!
- Up to 82% greater tractive ability on or off the road!
- 30 to 37% longer tire life!
- Greatest operating safety under any driving condition!
- Weight distribution permits larger legal payload!
- Fuel consumption no greater than in ordinary trucks!

FOUR AND SIX WHEEL DRIVE MODELS FROM 14,500 TO 60,000 LBS. G. V. W.

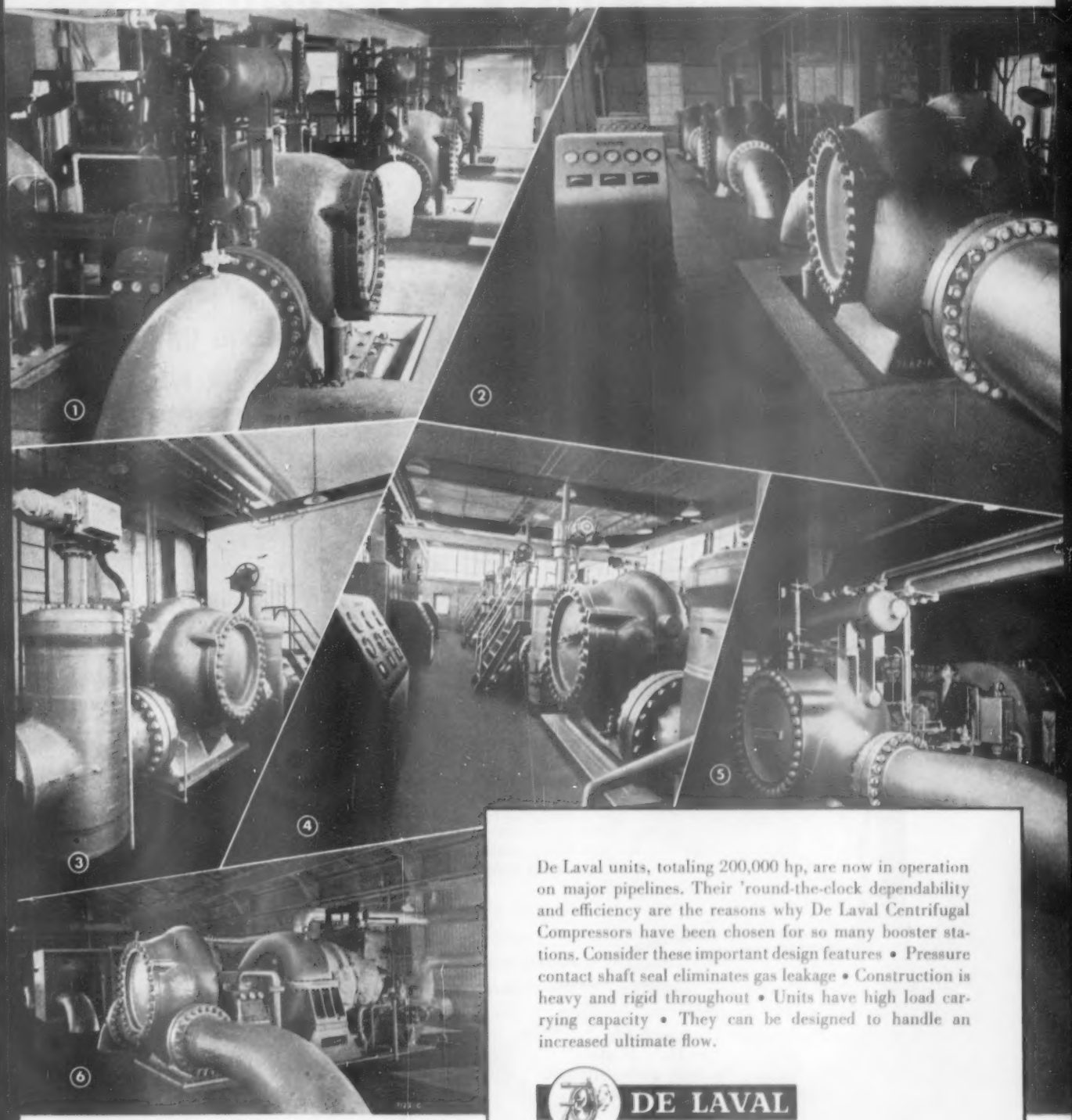
Write today for FREE, ILLUSTRATED BROCHURE on units in the weight classification you normally use. We'll also include your copy of "The Truck That Went To College" — detailed data on 7 years' intensive truck research conducted by the University of Wisconsin's College of Engineering.

BUILDERS OF AMERICA'S FWD FOREMOST HEAVY-DUTY TRUCKS

MATH-MATIC DESIGN

THE FOUR WHEEL DRIVE AUTO COMPANY, CLINTONVILLE, WISCONSIN, *Canadian Factory,* KITCHENER, ONTARIO

These pipelines depend on DE LAVAL *Centrifugal Compressors*



Located in booster stations of:

1. *Northern Natural Gas Company*
2. *El Paso Natural Gas Company*
3. *Southern Counties and Southern California Gas Companies*
4. *Texas Eastern Transmission Corporation*
5. *United Gas Pipe Line Company*
6. *Transcontinental Gas Pipe Line Corporation*

De Laval units, totaling 200,000 hp, are now in operation on major pipelines. Their 'round-the-clock dependability and efficiency are the reasons why De Laval Centrifugal Compressors have been chosen for so many booster stations. Consider these important design features • Pressure contact shaft seal eliminates gas leakage • Construction is heavy and rigid throughout • Units have high load carrying capacity • They can be designed to handle an increased ultimate flow.

DE LAVAL

Centrifugal Compressors

DE LAVAL STEAM TURBINE COMPANY

810 Nottingham Way, Trenton 2, New Jersey

DL-887

PUMP STRIPPER WELLS MORE PROFITABLY—

WITH

Carter

LONG-STROKE HYDRAULIC PUMPING UNITS-

• *Designed* • *Built* • *Priced* FOR STRIPPER WELLS

featuring the LONG, SLOW UPSTROKE and VARIABLE CYCLE which provide increased production — reduced Sanding Up — greater overall efficiency — longer life and low maintenance costs!

Actual records show that in many cases installation of Carter Units has caused substantial production increases. Long, slow upstroke and fast downstroke of Carter Units permit pumping at *nearly constant flow and with greatly improved overall efficiency.*

Some of the specific advantages Carter Pumping offers you are:

- Accurate control of pumping rate.
- Maximum production without pumping off or pounding fluid.
- Longer life for sucker rods and subsurface equipment.
- Reduction of costly downtime.
- Better handling of gassy, sandy or viscous fluids.
- Low first cost. Prices competitive with conventional mechanical equipment.
- Easily maintained by regular field personnel because of extreme simplicity of design and construction.
- No concrete foundation usually necessary
- Qualified representatives for sales and service are located at convenient points throughout the oil country.

With over 800 units now in service, some for as long as eight years, *the Carter method is increasingly recognized* by both majors and independents *as the better way to produce stripper wells.*

Available in Eight Models to suit your specific requirements.

WRITE for Bulletin PR-253

S. C. CARTER CO., Inc.
1900 Santa Fe Avenue
Los Angeles, California

SALES and SERVICE REPRESENTATIVES

ILLINOIS, INDIANA and KENTUCKY—Brediero Supply Company, Robinson, Salem, Ill.; Princeton, Evansville, Ind.; Irvine, Oil Springs and Owensboro, Ky. KANSAS, OHIO and WEST VIRGINIA—Buckeye Supply Company, Arkansas City, Chase, El Dorado, Great Bend, Wichita, Kansas; Wooster, Zanesville, Ohio; Vienna, W. Va. MICHIGAN—The Stryker Supply, Mt. Pleasant. OKLAHOMA—Wilson Supply Company, Tulsa; G. & G. Machine & Equipment Co., Hoolden. ARKANSAS, LOUISIANA, NEW MEXICO and TEXAS—Wilson Supply Company, Harvey, Houma, Lake Charles, New Iberia, Shreveport, Lea Allen Barbers Hill, Bay City, Beaumont, Columbus, Corpus Christi, Houston, Kilgore, Liberty, Mesquite, and Victoria, Texas; Beason Supply Company, Borger, Pampa, Texas. ROCKY MOUNTAIN AREA—Swan Specialties Co., Casper, Wyo.; Rexroth Oilfield Management Co., Conrad and Cut Bank, Montana. EXPORT: CANADA—Engineering Specialties Co., Edmonton; COLOMBIA and VENEZUELA—Wilson, S. A., Caracas, Maracaibo and Puerto la Cruz. TRINIDAD—Wilson and Johnstone Ltd., Port of Spain.

NEW "DOWN-UNDER" REFINERY

Covering 350 acres, Stanvac's Altona refinery will produce products for Australian consumption. The cat-cracker, centered in the map-outline photo at left, will tower 16 stories above the coastal plain.

will depend on I-R *Centrifugal Pumps for ALL SERVICES*

Now under construction near Melbourne, Australia, the new refinery of Standard-Vacuum Refining Company, Ltd. will have a capacity of 25,000 barrels per day. Erected by C. F. Braun & Co., Alhambra, Cal., this $37,000,000 project will constitute a complete refinery, with a half-dozen main process units, including crude distillation, catalytic cracking, catalytic reforming, alkylation and treating facilities.

It is of interest to note that *centrifugal pumps* throughout the entire installation will bear the familiar I-R nameplate. These Ingersoll-Rand pumps will be used for many refinery services—still reflux, boiler feed, gasoline transfer, etc. Their *proved dependability* is a matter of record throughout the world-wide petroleum industry.

Ingersoll-Rand

Cameron Pump Division
11 Broadway, New York 4, N. Y.

10-39

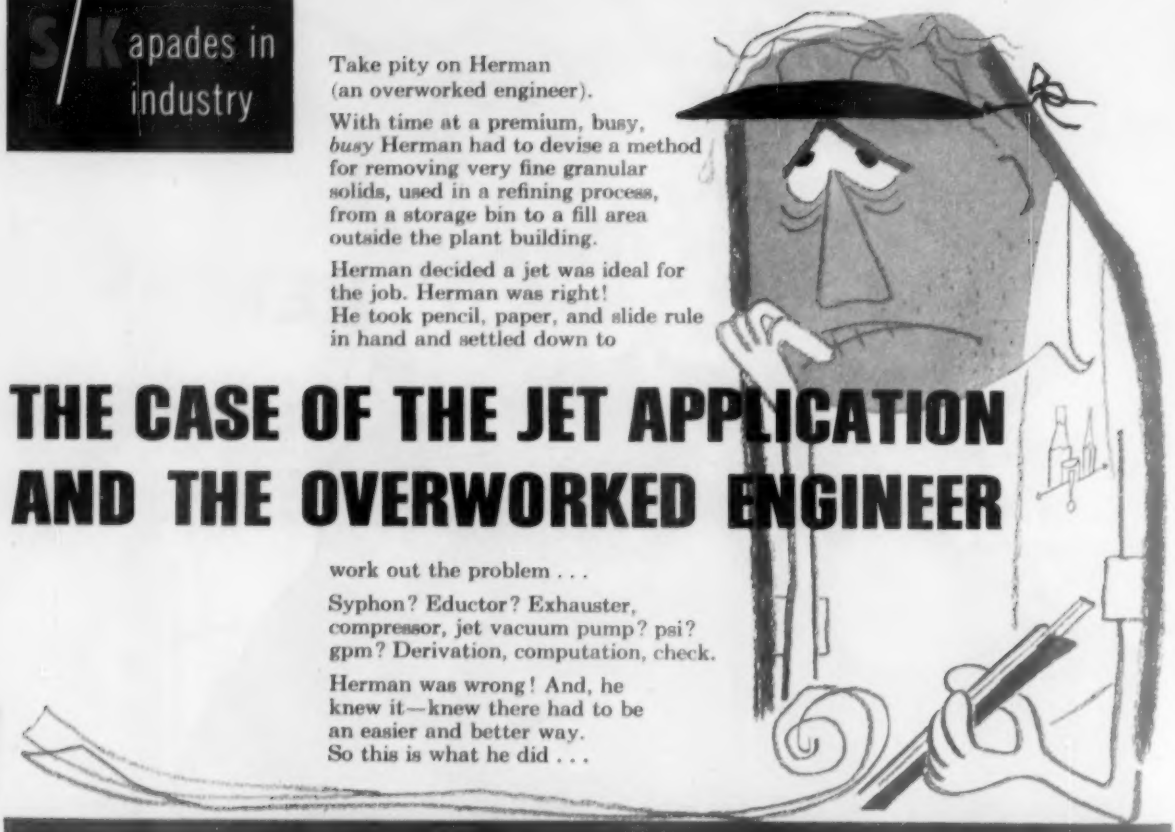
COMPRESSORS • TURBO-BLOWERS • PUMPS • GAS & DIESEL ENGINES • AIR & ELECTRIC TOOLS • VACUUM EQUIPMENT

S/K apades in industry

Take pity on Herman
(an overworked engineer).

With time at a premium, busy, *busy* Herman had to devise a method for removing very fine granular solids, used in a refining process, from a storage bin to a fill area outside the plant building.

Herman decided a jet was ideal for the job. Herman was right!
He took pencil, paper, and slide rule in hand and settled down to



THE CASE OF THE JET APPLICATION AND THE OVERWORKED ENGINEER

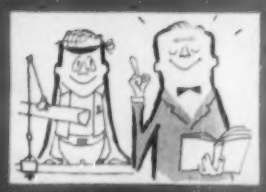
work out the problem . . .

Syphon? Eductor? Exhauster, compressor, jet vacuum pump? psi? gpm? Derivation, computation, check.

Herman was wrong! And, he knew it—knew there had to be an easier and better way.
So this is what he did . . .

Sent to Schutte and Koerting Company for a copy of new Bulletin J-1 on "Jet Apparatus and Its Industrial Applications." Found out what he needed to know about the characteristics, varieties, and ranges of Jet Apparatus.

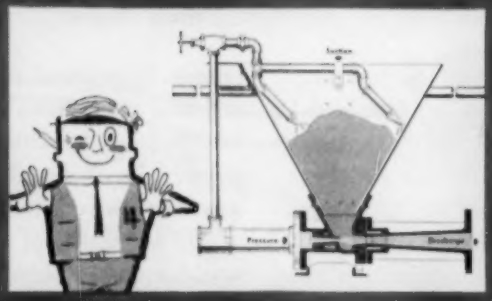
Located the services required and the types of jets suitable for such a function. Identified the type most suitable for his particular requirements.



Carried it to the nearest SK Sales Engineer—who gave him a specific recommendation.

SOLVED THE PROBLEM EASILY!

The SK Fig. 254 Hopper Eductor shown at right is ideal for handling granular solids. Solids are fed into the eductor hopper at a controlled rate. Water, bypassed from the pressure line, issues from the wash down nozzles and washes the solids into the eductor where they are entrained by the jet action of the pressure water and discharged.



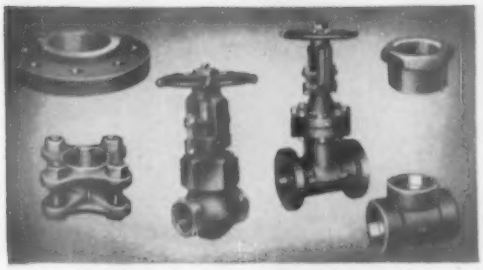
Moral! Request a copy of Bulletin J-1 for your files. Make use of a qualified specialist, your nearest SK Sales Engineer.

Schutte and Koerting
COMPANY
MANUFACTURING ENGINEERS

2219 STATE ROAD, CORNWELLS HEIGHTS, BUCKS COUNTY, PA.

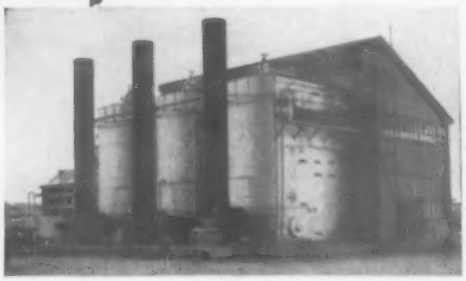
Jet Apparatus • Heat Transfer Equipment
Strainers • Condensers and Vacuum Pumps
Oil Burning Equipment • Rotameters
Flow Indicators • Radiafin Tubes • Valves
Spray Nozzles and Atomizers • Gear Pumps
Desuperheaters

Designed for today's *Tough* service demands



DROP FORGED VALVES AND FITTINGS FOR TOUGHNESS AND TROUBLE-FREE SERVICE

Drop forged from carbon and alloy steels, Vogt valves, fittings and flanges will safely handle liquids and gases at high pressures and high temperatures in power plants, chemical plants, petroleum refineries, etc.
The complete line includes flanged, screwed and socket weld end globe, gate and check valves—ells, tees, and crosses—couplings—bushings—plugs—unions—flanges and flange unions—and welding heads.



MODERN STEAM GENERATORS

Vogt steam generators are designed to give maximum rating in a minimum of space, with high efficiency and low maintenance expense. Bent tube types and straight tube, forged steel sectional header types to burn solid, liquid or gaseous fuels meet every power, process or heating requirement.

PROCESS EQUIPMENT FOR EVERY SERVICE

Vogt constructs process equipment in wide variety to all Codes. Stills and towers, oil chillers, crystallizers, heat exchangers, molding machines, etc., serve in the manufacture of oils, greases, 100 octane gasoline, synthetic rubber, chemicals and related products around the world.

SPECIAL MATERIALS COMBAT CORROSION AND PRODUCT CONTAMINATION

Our modern shops produce a wide variety of equipment from special metals and alloys to fight corrosion and product discoloration or contamination. Fabrication procedures insure that corrosion resistant properties of welds will match that of the materials used to construct the equipment.

MORE REFRIGERATION TONNAGE AT LESS COST

More than 70 years of engineering and manufacturing experience is incorporated in Vogt refrigerating and ice making equipment. Absorption Systems, Compression Systems, and Tube-Ice Machines in a wide range of capacities serve industrial and processing plants, and institutions, here and abroad.

Vogt

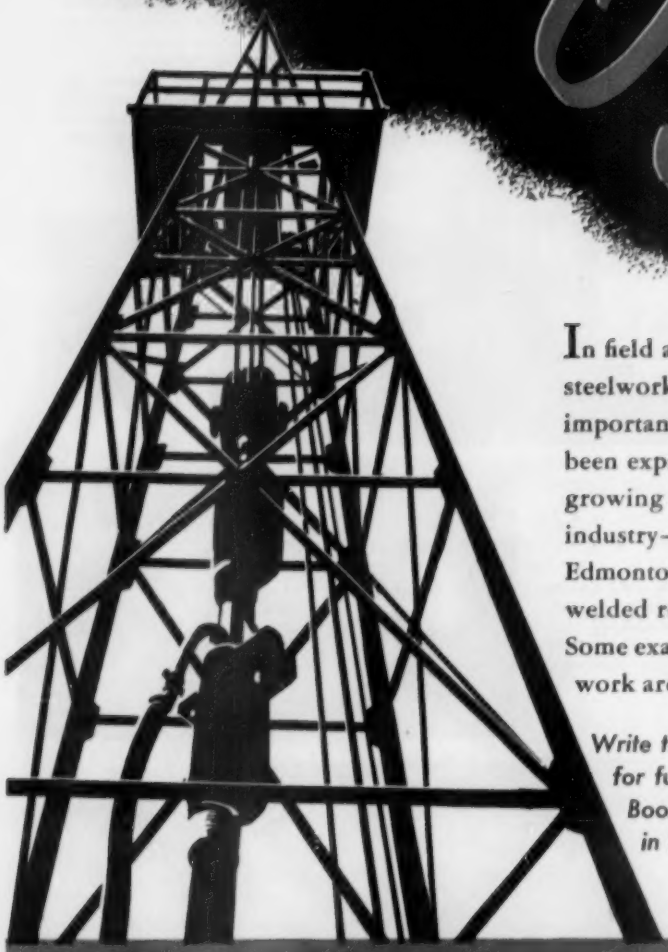
PRODUCTS

FOR REFINERIES, CHEMICAL PLANTS POWER PLANTS AND PROCESS INDUSTRIES

HENRY VOGT MACHINE CO.
LOUISVILLE 10, KY.

BRANCH OFFICES: New York, Philadelphia, Chicago, Cleveland St. Louis, Dallas, Charleston, W. Va.

SERVING CANADA'S *Oil Industry*

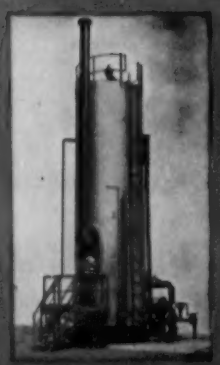


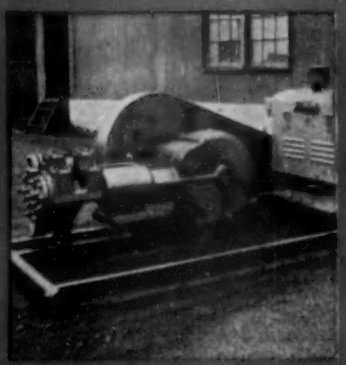
In field and refinery operations custom steelwork by Dominion Bridge plays an important role. Our Western plants have been expanded and re-equipped to meet the growing needs of Canada's thriving oil industry—including complete facilities at Edmonton for the fabrication of Class I welded refinery pressure vessels. Some examples of our work are shown below.

Write to Box 280, Montreal, for fully illustrated Booklet BSE "Builders in Steel".

DOMINION BRIDGE COMPANY LIMITED

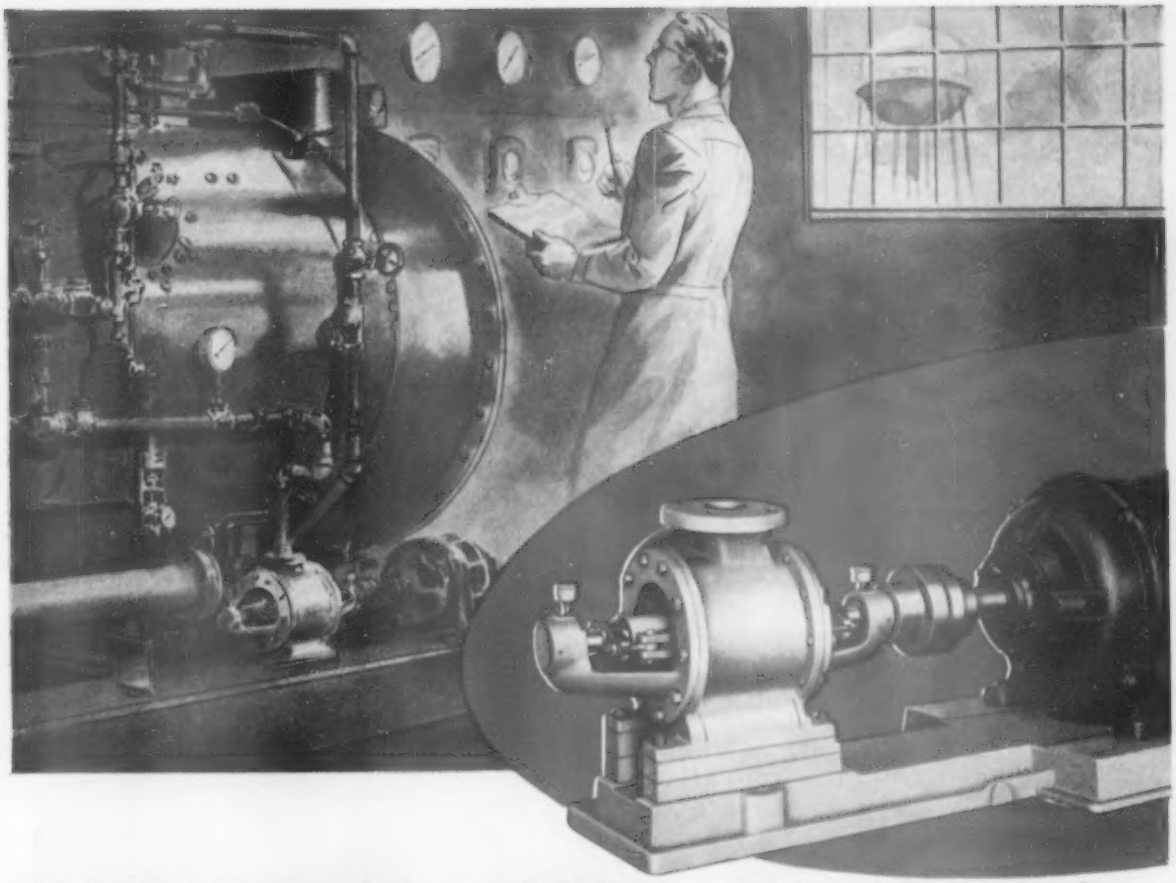
FRACTIONATOR TOWERS | TREATER UNITS | PUMPS | OIL STORAGE TANKS





DIVISIONS: STRUCTURAL, PLATEWORK, BOILER, MECHANICAL, WAREHOUSE

Plants at: MONTREAL, OTTAWA, TORONTO, WINNIPEG, CALGARY, VANCOUVER,
Assoc. Companies at: AMHERST, N.S. QUEBEC, SAULT STE-MARIE, EDMONTON



ADD Economy and Dependability . . . *DEDUCT* Costs with—

MODERN PUMPING EQUIPMENT

DUDCO DIVISION
Hazel Park, Mich.
Dual-Vane Hydraulic Pumps, 3 to 120 gpm; Fluid Motors, 7 to 140 hp; 2000 psi operation. Piston-Type Pumps for 5000 psi.

HYDRECO DIVISION
Cleveland, Ohio
Gear-Type Hydraulic Pumps, 3 to 120 gpm; Fluid Motors, 3 to 52 hp; Cylinders; Control and Auxiliary Valves; 1500 psi.

WATERTOWN DIVISION
Watertown, N. Y.
Railroad air brake valves for freight and passenger equipment, STRATOPOWER Hydraulic Pumps for Aircraft, to 3000 psi.

KINNEY MANUFACTURING DIVISION
Boston, Mass.
Rotating Plunger and Heliquad Liquid Handling Pumps, to 3000 gpm. Vacuum Pumps, 0.2 micron, evacuate 1800 cfm.

AURORA PUMP DIVISION
Aurora, Ill.
Liquid Handling Pumps, Centrifugals, 4000 gpm, 500 ft. heads. Turbine-Types, 7000 gpm. Condensate Return Units.

From the sump in the basement to the water tower above the plant, your Liquid Handling Equipment is moving *dollars* as well as water. Are these dollars profit or loss? That is the question!

The Aurora Pump and Kinney Manufacturing Divisions of The New York Air Brake Company provide industry with the Pumps to modernize all Liquid Handling installations. For plant water systems; for sump, boiler feed, condensate return, refrigeration, air conditioning and drainage . . . Aurora and Apco Turbine and Centrifugal Pumps bring important economies to every problem of water transfer. These pumps cover a broad range of capacities, pressures, configurations and choice of drives. In many cases, they perform special services in the processing of beverages, chemicals, acids and the transfer of gasoline and oil.

Kinney Pumps, in Rotating Plunger and Heliquad Gear types, have a well established reputation of being able to *"move anything that will flow through a pipe"*. They are the economical answer to the processing of sludges, slurries, asphalt, bunker fuel, waxes, molasses and other viscous or semi-solid substances.

For Vacuum Processing, the new developments in Kinney High Vacuum Pumps afford added opportunities for savings in production costs.

A fourth, and equally interesting, opportunity to increase productivity and reduce costs is found in the Fluid Power facilities of the Dudco, Hydreco and Watertown Divisions of The New York Air Brake Company.

Look to YOUR Pumps! They represent one of the most important areas for savings in the modern plant.

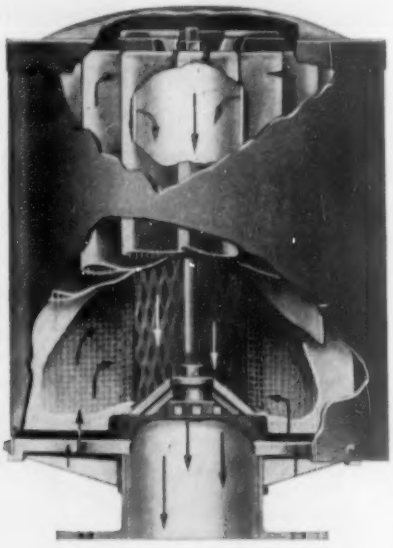
Literature fully describing these modern Liquid Handling, Vacuum Processing and Fluid Power pumps, as well as Air Brake's exceptional facilities for precision sub-contract work, is yours for the asking. Write for it today!

THE NEW YORK AIR BRAKE COMPANY

230 PARK AVENUE • NEW YORK 17, N. Y.

"LET'S SPECIFY STAYNEW INTAKE FILTERS

They give us positive protection . . . They won't need regularly scheduled maintenance . . . They're easy to clean on the job . . . Efficient over a wide range of loads . . . They're not affected by temperature change . . . There's no oil carry-over OUR EQUIPMENT WILL LAST LONGER!"



MODEL D
Intake Filter

Industrial engineers everywhere know that Staynew's *Positive Protection* lengthens equipment life. From compressors to generators . . . from blowers to internal combustion engines, Staynew Intake Filters stop dust and dirt from entering through air intakes, causing carbon accumulation and needless wear. And Staynew Filters frequently operate two or more years *without maintenance.* When cleaning is indicated, a brush or simple vacuum cleaning insert is all you need. Specify Staynew and increase productive time.

Write for Complete Booklet on Staynew Intake Filters.

Representatives in Principal Cities

DOLLINGER PROTECTOMOTOR STAYNEW FILTERS

DOLLINGER CORPORATION

5 Centre Pk., Rochester 3, N. Y.

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

Wherever weeds and grasses are a

FIRE HAZARD... *you need*

this reliable weed destroyer!

BORASCU®

WEED KILLER

Borascu gives you the safety of bare ground about any installation at any location—well sites, tank batteries, heater units, and buildings. And you get this freedom from fire-hazardous vegetation with lower cost than other methods! Some economy-minded production men figure the Borascu way has resulted in 80% savings!

Borascu is a granular, nonorganic, nonselective weed killer which affects *all* vegetation! Borascu does not break down in soil but remains active for long periods to keep vegetation from reappearing. Just a man and a pail is all you require for applications—no other equipment is necessary; there is nothing to mix and no water to haul. You won't know how easy it is to keep grounds bare of fire-hazardous weeds and grasses 'til you try Borascu!

WHEN BORASCU'S IN THE SOIL... WEEDS STAY OUT!

NOTHING TO MIX
NO WATER TO HAUL
NONPOISONOUS
NONCORROSIVE TO FERROUS METALS

MANUFACTURERS OF FAMOUS "20 MULE TEAM" PACKAGE PRODUCTS

PACIFIC COAST BORAX CO.

DIVISION OF BORAX CONSOLIDATED, LIMITED

630 SHATTO PLACE • LOS ANGELES, CALIFORNIA

DISTRIBUTORS LOCATED THROUGHOUT OIL FIELDS OF U.S.A., CANADA, MEXICO, COLOMBIA, VENEZUELA

Continental Red Seal®

MEANS MORE AND BETTER POWER

INDUSTRIAL GASOLINE ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
N56	4	2⅛	3½	56	14.2 @ 2200 RPM
N62	4	2⅛	3½	62	15 @ 2200 RPM
Y69	4	2½	3½	69	21.4 @ 2400 RPM
Y91	4	2⅞	3½	91	28.5 @ 2400 RPM
Y112	4	3 1/16	3½	112	32 @ 2400 RPM
F124	4	3	4½	124	36 @ 2400 RPM
F140	4	3 1/16	4½	140	42 @ 2400 RPM
F162	4	3 1/16	4½	162	49 @ 2400 RPM
F186	6	3	4½	186	60.5 @ 2400 RPM
*E201	4	3⅜	4½	201	59 @ 2000 RPM
F209	6	3 1/16	4½	209	68 @ 2400 RPM
F226	6	3 1/16	4½	226	73 @ 2400 RPM
F244	6	3 1/16	4½	244	79 @ 2400 RPM
M271	6	3⅜	4½	271	86.2 @ 2400 RPM
M290	6	3¼	4½	290	92.2 @ 2400 RPM
M330	6	4	4½	330	104.4 @ 2400 RPM
M363	6	4	4 1/16	363	109 @ 2000 RPM
B371	6	4⅛	4⅝	371	110 @ 2400 RPM
B427	6	4 1/16	4⅝	427	127 @ 2400 RPM
G134	4	3¼	4½	134	32.2 @ 2000 RPM
G157	4	3¼	4½	157	37.7 @ 2000 RPM
H227	4	3¾	5½	227	52 @ 1800 RPM
H243	4	3¼	5½	243	56 @ 1800 RPM
*H260	4	3⅜	5½	260	60 @ 1800 RPM
T371	6	4⅛	4⅝	371	119 @ 2400 RPM
*J382	4	4½	6	382	74.2 @ 1400 RPM
T427	6	4 1/16	4⅝	427	140 @ 2400 RPM
U501	6	4½	5¼	501	160 @ 2400 RPM
R513	6	4½	5⅛	513	164.3 @ 2400 RPM
R572	6	4⅝	5⅛	572	182.4 @ 2400 RPM
R602	6	4⅞	5⅛	602	191.7 @ 2400 RPM
S749	6	5⅛	5½	749	217 @ 2200 RPM
S820	6	5⅜	5½	820	237 @ 2200 RPM

INDUSTRIAL DIESEL ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
GD157	4	3⅛	4⅛	157	39 @ 2000 RPM
*ED201	4	3⅜	4½	201	45.8 @ 2000 RPM
HD243	4	3⅜	5½	243	54.7 @ 2000 RPM
*HD260	4	3⅜	5½	260	59.3 @ 2000 RPM
*JD382	4	4½	6	382	72.5 @ 1600 RPM
TD427	6	4 1/16	4⅝	427	106.5 @ 2000 RPM
RD572	6	4¼	5⅛	572	142.5 @ 2000 RPM
SD802	6	5 1/16	5½	802	202 @ 1800 RPM

*Available for industrial applications only.

Both the builder and the end user of Continental-powered equipment benefit by Continental Motors' long experience in the field of internal combustion power . . . profit by engineering features, and advances in production technique, evolved of a period of 52 years. Continental dependability, stamina and economy have long been building prestige for quality leaders, not only in the transportation, farm and industrial equipment fields, but also in oil field producing, distribution and processing —providing more and better power, at lower over-all cost.

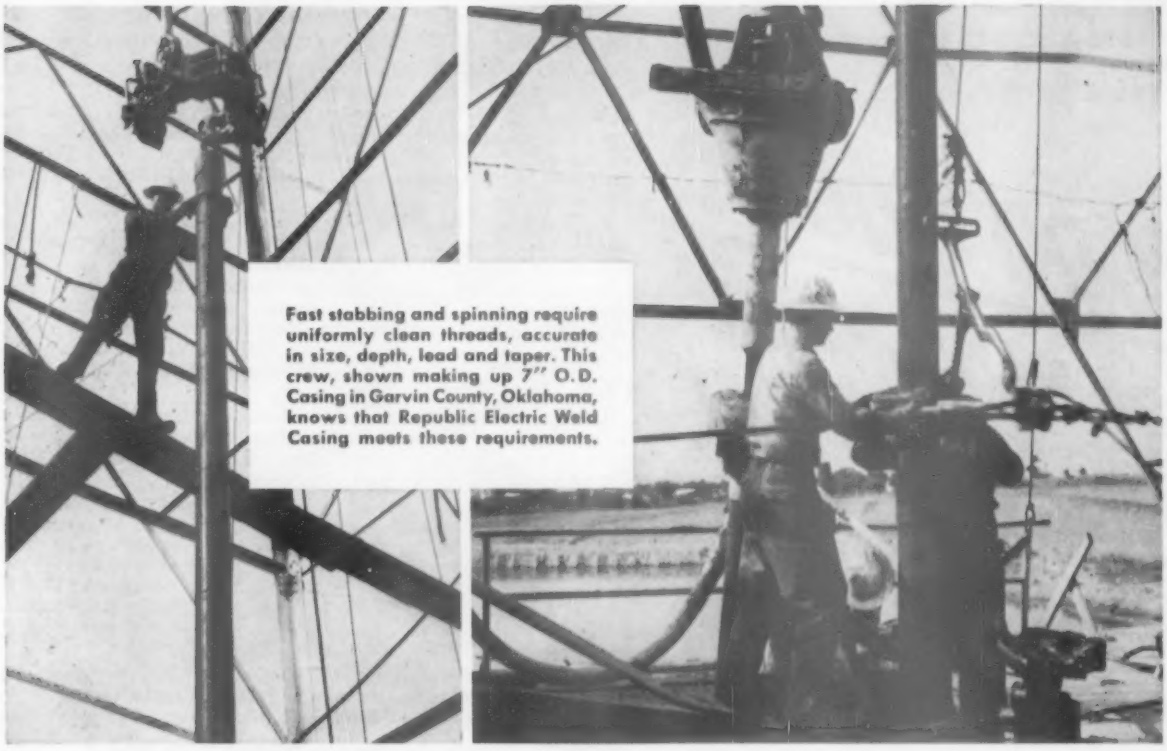
The broad line of industrial models listed at the left is now supplemented by five air-cooled unit power plants designated as Packettes. These engines, featuring light aircraft type construction and using time-tested basic aircraft engine parts, span a power range from 34 to 220 h.p. Full information on request.

8 EAST 49TH ST., NEW YORK 17, NEW YORK • 6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS • 3817 S. SANTA FE AVE., LOS ANGELES 58, CALIF.
918 S. BOSTON ST., ROOM 1008, TULSA, OKLA. • 1252 OAKLEIGH DRIVE, EAST POINT (ATLANTA) GA.

Continental Motors Corporation

MUSKEGON, MICHIGAN

PARTS AND SERVICE EVERYWHERE



Fast stabbing and spinning require uniformly clean threads, accurate in size, depth, lead and taper. This crew, shown making up 7" O.D. Casing in Garvin County, Oklahoma, knows that Republic Electric Weld Casing meets these requirements.

Where strings hang by threads ... operators depend on REPUBLIC ELECTRIC WELD CASING AND TUBING

The longer the string, the heavier the strain on the threads in each joint. And one weak joint can spell disaster, shoot costs sky high.

Operators avoid expensive failures by specifying dependable Republic Electric Weld Casing and Tubing. They know that these products are consistently uniform in wall thickness, size, concentricity and diameter. They know this assures threads that have uniform depth of tough steel at every point under the root line to resist joint failure.

Made from high-ductility steel, Republic Electric Weld Casing is fully normalized for uniform structure, then cold sized for high yield strength. And its high resistance to collapse provides added protection in the hole.

Republic's Normalized Electric Weld Casing and Tubing, standards in the industry for over 25 years, are available in grades H-40 and J-55; in sizes ranging from 2⅜" through 13⅜" O.D.

Republic Makes Both—In addition to Electric Weld, Republic is now a major producer of Seamless Casing and Tubing. Produced in the world's most modern seamless mill, Republic Seamless quality is carefully guarded by the latest in precision equipment and techniques. Made in grades J-55 and N-80; sizes from 2⅜" through 9⅝" O.D. For complete information, call your nearest Republic sales office. Or write to:

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

REPUBLIC
CASING AND TUBING
Electric Weld and Seamless

Other Republic Products include Line Pipe—Steel and Plastic Pipe—Carbon, Alloy and Stainless Steels—Studs, Bolts and Nuts—Heat Exchanger Tubes

want high speed plus endurance? How's this...

1000 HOURS at 3600 R.P.M. UNDER FULL LOAD!

If you were to drive 90,000 miles up an incline at 90 m.p.h., you would approximate the performance of the Model 24A, 331 cubic inch displacement Chrysler Industrial Engine pictured below.

To prove the power of Chrysler Industrial V8 Engines . . . their ability to run for long periods of time at high speed . . . on March 17, 1954 Chrysler engineers placed a production model Ind. 24A Engine on an endurance dynamometer at Chrysler Central Engineering Laboratories. Objective: 1000 hours operation at 3600 R.P.M. under full load.

During every one of the 1000 hours, the Chrysler Ind. 24A Engine delivered an average of 174 horsepower and when shut down, the engine was still in perfect operating condition.

During the run no service was necessary beyond minor maintenance care, such as oil changes and very infrequent spark plug changes and point adjustment. Yet, following disassembly of the engine, the only wear noted was negligible—no more than you might expect from an engine that has been operated for 1000 hours within a long period of time.

While there is every reason to believe that this is a record-breaking endurance run (and don't forget it was made at 3600 R.P.M. under full load), we are confident that every Chrysler Industrial V8 Engine will *at least equal* this astounding record.

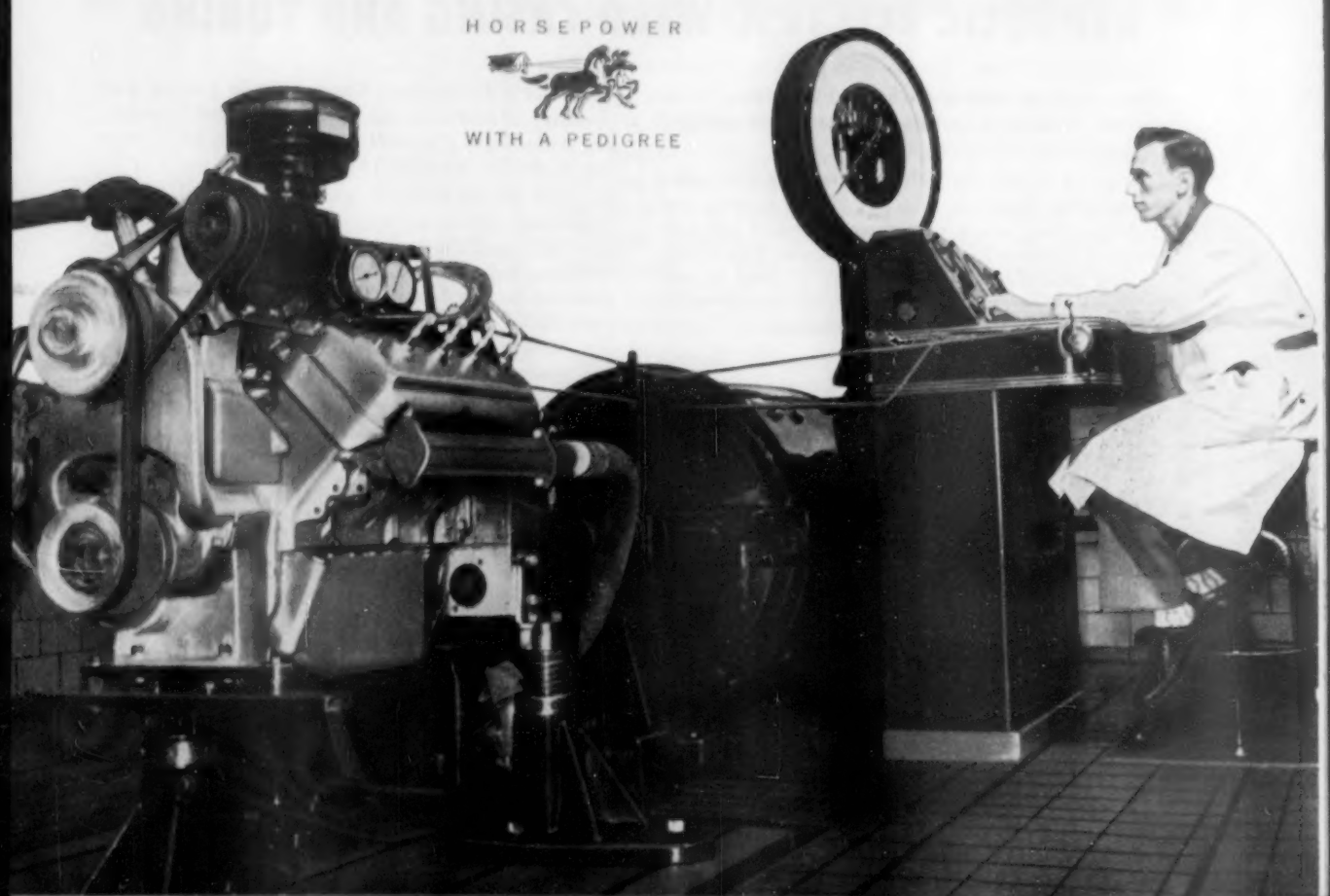
This proves too, beyond a doubt, that the Chrysler Industrial V8 hemispherical combustion chamber design with its short-stroke, low-friction construction, makes an ideal power plant for any equipment that requires continuous high speed operation. Furthermore, in installing a Chrysler V8 Engine in preference to a diesel engine of similar horsepower, you can reduce your size estimate by one-half, your weight by two-thirds, and your cost factor by three-quarters!

For detailed information on the Model 24A or any Chrysler Industrial Engine, see a Chrysler Industrial Engine Dealer, or write: ***Dept. 1412, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.***

CHRYSLER *Industrial Engines*

INDUSTRIAL ENGINE DIVISION • CHRYSLER CORPORATION

HORSEPOWER WITH A PEDIGREE



...it stands alone–

In this latest development we reaffirm our pledge to make a better gauge ever better. Only in the Marsh Christmas Tree Gauge you have:

—**A better tube construction**— bourdon tube and socket fused into a one piece permanently leak-proof unit by the exclusive Marsh "Conoweld" process.

—**A better movement**—all but frictionless as a result of the self-lubricating effect of unlike metals. Coined sector gear gives greater strength where greater strength is needed; also smoother operation.

—**A better case**—a copper-clad wrought steel case of boiler plate thickness, produced by the "Marsh-alloy" process. It has the strength of steel, the corrosion resistance of copper, and is one-third lighter than conventional cast-rion cases. The case is finished in corrosion-resistant satin black enamel.

—**the Marsh "Recalibrator"**—not only the handiest way to keep a guage accurate; also the *best* way.

★ There is a Marsh Gauge for every oil country and refinery application. Ask your supply house or write for latest bulletins.

MARSH INSTRUMENT CO.
Sales affiliate of Jas. P. Marsh Corporation
DEPT. L., SKOKIE, ILL.
Houston Branch Plant: 1121 Rothwell St., Sect. 15, Houston, Texas

MARSH STOCKED by Your Local Supply Store **GAUGES**

no job is too BIG for AVONDALE

60' Section of CALCO Pipe Jacket built by Avondale. In the background to the right, fabrication of superstructure.

The business of offshore drilling is a BIG business,requiring BIG equipment. The Petroleum Industry needs Drill Barges, Derrick Barges, Pile Driver Barges, Pipe Jacket and Platform Structures—all built to the highest standards of quality and performance. Avondale knows how to give the Oil Industry what it wants and needs in the way of construction, repair and fabrication. Their fame is well known . . . their Integrity and "know-how" unchallenged.

CONSULT AVONDALE ON YOUR NEXT JOB.

SHIP BUILDING • SHIP REPAIRING • FOUNDERS • PROPELLERS • STRUCTURAL STEEL

AVONDALE MARINE WAYS, INC. CABLE ADDRESS "AVONWAYS"

P. O. BOX 1030 • PHONE UNiversity 4561 • NEW ORLEANS 8, U. S. A.

new V-12

WAUKESHA

Diesel **VLR SERIES UNITS** *Gas*

TURBOCHARGED DIESEL — 1100 HP
LPG — 870 HP • NAT. GAS — 780 HP
NORMAL DIESEL — 800 HP

(Complete unit ratings—1200 rpm)

This powerful new Waukesha is a twelve-cylinder, high compression, overhead valve, 60-degree vee, four-cycle engine of 8½-inch bore and stroke, and 5788 cubic inch displacement. Connecting rods are side by side type; opposing pistons operating from a single wide-area crankpin. Bare engine ratings at 1200 rpm are: Turbocharged Diesel, 1135 hp; Normal Diesel, 830 hp; Butane-Propane, 900 hp; Natural Gas, 810 hp. Response to throttle and load requirements is quick and smooth, with a fast surge of reserve power for emergency and overload demands. Tremendous in power, remarkably rugged, the V-12 is designed for simplicity and reliability. Major parts are interchangeable between right and left cylinder banks. Main and rod bearings are easily accessible. Strength, precision and balance are built into all elements of the power train, from pistons to flywheel. Supporting members are designed for extreme rigidity and perfect alignment of moving parts. Send for Bulletin 1656.

WAUKESHA MOTOR COMPANY

WAUKESHA, WIS.

NEW YORK • TULSA
LOS ANGELES

MARVEL INVERSE OILER–

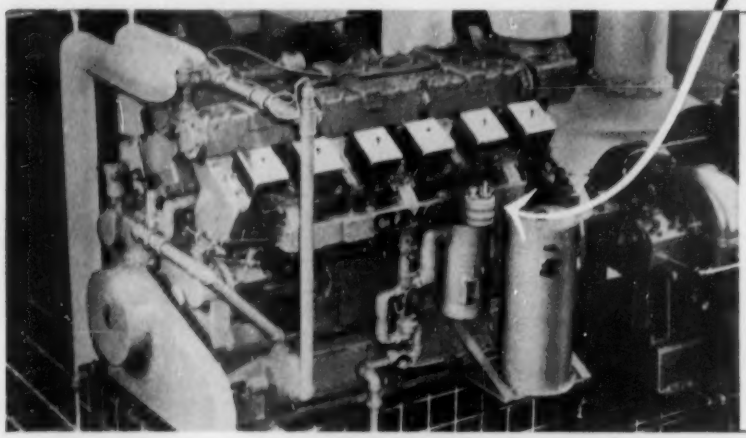
Vital Part of World's Finest Engines

Engine manufacturers think so highly of the Marvel Inverse Oiler they have incorporated it as a vital unit in their engines' lubrication systems.

They have found that engines, equipped with Marvel Inverse Oilers, can be depended upon to give quick acceleration to save trip time . . . keep operating costs to a minimum . . . guarantee hours of continuous performance . . . keep "down-time" low by extending periods between overhauls.

The famous Climax Engines, one of which is pictured below, is an example. A truly fine performer, it is equipped with a Marvel Inverse Oiler for Marvel Mystery Oil—finest performing lubricant of all.

The Marvel Inverse Oiler feeds Marvel Mystery Oil in exact proportion to engine speed and load . . . properly lubricating valves and guides, preventing wear and sticking. Keeps upper piston rings free in their grooves . . . retards ring flutter . . . and cushions ring pounding which can result in ring breakages. Remember, it is the *oil* which must do these things and only Marvel Mystery Oil is blended for this purpose and for this oiler.



The Marvel Inverse Oiler

is an integral part of the Climax 12 cylinder, 171 H.P., 600 RPM GAS ENGINE. Operating off the intake manifold, this completely automatic Oiler feeds Marvel Mystery Oil exactly in proportion to engine loads . . . gives direct protection to the all-important upper cylinder areas.

This Chart shows the proper setting for constant load engines

BRAKE H. P. AT BELT	NAT. GAS CU. FT. PER HOUR	BUTANE GALLONS PER HOUR	GASOLINE GALLONS PER HOUR	M. M. OIL DROPS PER MIN.	M. M. OIL HOURS PER QUART
10	115.	1.07	1.12	4	228
15	172.5	1.60	1.68	6	152
20	230.	2.14	2.24	8	114
25	287.5	2.67	2.80	10	91
30	345.	3.21	3.36	12	76
35	402.5	3.74	3.92	14	65
40	460.	4.28	4.48	16	57
45	517.5	4.81	5.04	18	50
50	575.	5.35	5.60	20	45
60	690.	6.42	6.72	24	38
70	805.	7.49	7.84	28	32
80	920.	8.56	8.96	32	28
90	1035.	9.63	10.08	36	25
100	1150.	10.70	11.20	40	22
120	1380.	12.84	13.44	48	19
140	1610.	14.98	15.68	56	17
160	1840.	17.12	17.92	64	14
180	2070.	19.26	20.16	72	12
200	2300.	21.40	22.40	80	11
225	2587.5	24.00	25.20	90	10
250	2875.	26.75	28.00	100	9
275	3162.5	29.42	31.10	110	8
300	3450.	32.10	33.60	120	7

Chart shows total oil consumption

EXAMPLE:—If you use 805 cu. ft. of dry gas, 7.49 gallons of butane or 7.84 gallons of gasoline, your H.P. is about 70, so adjust oiler to feed 28 drops per minute. You will then receive about 32 hours per quart of MARVEL MYSTERY OIL.

If engine load increases after setting for normal load, oiler will automatically increase its feed, decreasing when load is lessened.

To determine drop count per oiler when more than one is used on an engine—divide recommended drop count by number of oilers.

NOTE: Guarantee on oiler is void if any other oil than MARVEL MYSTERY OIL is used. Some *engines* also carry this guarantee policy.

See Your Local Jobber or Oil Well Supply House

EMEROL MFG. CO.

Dept. 376, 242 West 69th Street New York 23, N. Y.

NEW

LUNKENHEIMER QUARTER-INCH BRONZE NEEDLE VALVES

Fig. 906

Solve your space problems!

INSTRUMENT BOARDS ARE CROWDED — and up until now, the size of needle valves installed behind instrument panels has been a serious problem. But this revolutionary new quarter-inch valve *saves as much as 20% in size* — yet is actually stronger than the conventional design.

It's safer, more accurate, and more compact — easier to install and maintain! The reason: the body of the new figure 906 is carefully machined out of a cast block of close-grained bronze. It gives you all three of the "most wanted" needle valve features — great strength, compact size, and absolute accuracy of flow control.

Figure 906 is available in a wide range of sizes and in both globe and angle patterns. The quarter-inch size, designed for instrumentation, is only 2¾ inches high — 1½ inches wide. Larger sizes, where bulk is not a problem, are comparable to conventional needle valves. In the globe design, you can take your choice of famous Stemalloy® bronze stems or cadmium-plated steel stems. All patterns have new gland followers and fine thread-pitch for close regulation.

LUNKENHEIMER

QUALITY

BRONZE • IRON • STEEL

FOR MORE INFORMATION, request Circular 568. Your Lunkenheimer Distributor has it, or you can write for a copy to The Lunkenheimer Company, Box 360-F, Cincinnati 14, Ohio.

*Patented Alloy

LUNKENHEIMER

THE ONE *Great* NAME IN VALVES

L-151-23

R/M SUPER-POWER V-BELTS...

Today's bigger rigs, higher rig floors and heavier power loads demand greater strength and more power delivery than ever in V-belt drives. R/M Super-Power V-Belts have that extra strength and power. With R/M Super-Power V-Belts you get 40% greater horsepower capacity than with regular V-belts. A combination of new synthetic fibers in the V-belt strength member provides greater resistance to heavy shock loads . . . virtually eliminates belt stretch and matching problems. R/M Super-Power construction, plus straight side-walls, means better belt tensioning and grip, less slip . . . more power delivered on the drive—*extra* power for your drilling and pumping operations. In addition, R/M Super-Power V-Belts are oil-proof, non-spark and heat resistant.

These features add up to "MORE USE PER DOLLAR" when you specify R/M Super-Power V-Belts for your drilling rigs and pumping units. Write for a copy of Bulletin 6628. And inquire also about other R/M V-Belt constructions, flat belts and rubber hose specially engineered by Manhattan for use in the oil field.

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Bowling Balls

ANCIENT meets MODERN...

Old Chain and Sprocket Pump Jack and VICKERS Modern Long Stroke HYDRAULIC PUMPING UNIT

The chain and sprocket pump jack shown in the foreground is an interesting link with the past. It is pumping a 400 ft well drilled more than 60 years ago.

Back of it is the most modern and efficient pumping unit available today . . . a Vickers Hydraulic Unit pumping from a depth of approximately 7,200 feet. Total well depth is about 9,000 feet.

Vickers Long Stroke Hydraulic Pumping Units provide reliable, efficient, low cost pumping for deep wells. Built in two-stroke lengths (20 ft and 30 ft) they have many advantages including: fewer stress reversals, lower stress range, lower acceleration forces, lower peak loads, lower standing valve velocities, constant stroke rate, greater sub-surface efficiency. Results are lower maintenance cost, less down time, increased production and increased profit.

Write for Bulletin 53-51

Vickers Model JV-20400-AV
20-ft stroke length
7 strokes per minute
35,000 lb polished rod load capacity
(Also available in 30-ft stroke)

Vickers Long Stroke Hydraulic Pumping Unit installed in 1953 on Union Oil Company Torrey Well No. 93. Old chain and sprocket jack in foreground is pumping well drilled about 1890.

VICKERS Incorporated

DIVISION OF THE SPERRY CORPORATION

Petroleum Equipment Department

2160 EAST IMPERIAL HIGHWAY • EL SEGUNDO, CALIF.

Offices: 900 E. Second St., Odessa, Texas
317 Thompson Bldg., Tulsa, Okla.

Write for BULLETIN 53-51

6893

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

Proof of *INCREASED PREFERENCE for WISCONSIN HEAVY-DUTY Air-Cooled ENGINES

3 TO 36 H.P. Range

*Based on U. S. Bureau of Census Statistics, Wisconsin Motor Corporation leads the engine industry with 50.72% of total production in 11 to 176 cu. in. displ. bracket — an industry-wide gain of 1.33%, as summarized below.

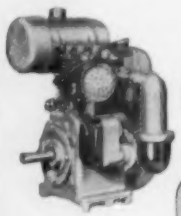
Once more U. S. Bureau of Census statistics provide authentic proof of outstanding preference for Wisconsin Air-Cooled Engines in the internal combustion engine field.

The latest "Facts for Industry" census report, released July 19, 1954, reveals the interesting fact that Wisconsin Motor Corporation produced 5,605 MORE engines in the 11 to 176 cu. in. displ. census grouping than ALL other internal combustion engine manufacturers combined, during 1953. This refers, of course, to engines built for re-sale, exclusive of automotive, aircraft, outboard, miniature and "captive" engines.

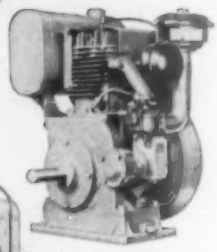
Translated into industry-wide percentages, census figures indicate that this company showed a gain of 1.33% over the combined production of all other engine builders. This, however, is an ultra-conservative figure inasmuch as the Wisconsin line covers a range of 13.5 to 154 cu. in. piston displacement whereas the Census Report grouping covers engines from 11 to 176 cu. in. displacement. In spite of this fact, Wisconsin Engine production amounted to 50.72% of the Industry's total in above grouping.

Statistically, these figures are interesting to us as evidence of consistent progress. To the Original Equipment Builder, Distributor and User of engine power, this report provides definite proof of INCREASED PREFERENCE for Wisconsin Heavy-Duty Air-Cooled Engines among people who are best qualified to judge comparative engine values in terms of performance, economy and low-cost maintenance.

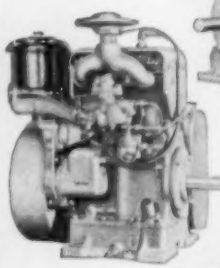
You can't go wrong if you specify WISCONSIN Engines for the equipment lines you *sell, build* or *use*.



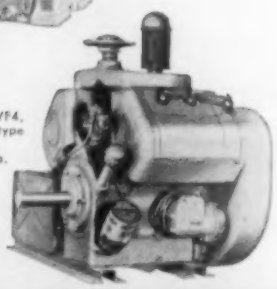
Models ABN, AKN, AEN, 4-cycle single cylinder, 3 to 8¼ hp.



Models AFH, AGH, AHH, single cylinder, 6 to 9 hp.



Models TE, TF, TFD 2-cylinder 7 to 15 hp.



Models VE4, VF4, and VG4D, V-type 4-cylinder, 15 to 36 hp.

WISCONSIN MOTOR Corporation
MILWAUKEE 46, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

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CHEMICAL PROCESS NEWS

PUBLISHED BY CHEMICAL PROCESS DIVISION, THE M. W. KELLOGG COMPANY DECEMBER 1954

NOTES ON AMMONIA

One of the latest developments in the ammonia field is Kellogg's radical reduction in investment expenditures required to build a plant. As evidence of this, the company was recently awarded a contract for a 300 tons-per-day plant in the Midwest at the unusually low investment cost of about $50 per ton of annual capacity. Comparable plants have run upwards of twice this figure.

* * *

One source of this big saving lies in the fact that previous experience with Kellogg's high-pressure gas reforming step has resulted in refinements which increase its already high efficiency and more than proportionately decrease its cost. Furthermore, the process will employ only one synthesis section. In addition, operating experience with Kellogg ammonia converters has shown that they can be substantially reduced in size as can the heat exchangers without sacrifice of capacity.

* * *

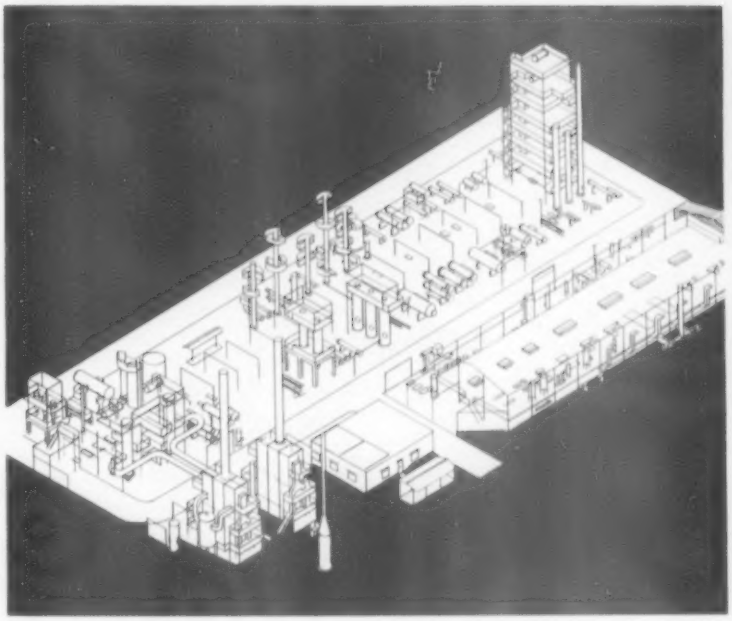
These developments come on top of a considerable amount of ammonia manufacturing know-how which Kellogg has been acquiring since the early 1940's. For example, another of the company's contributions to ammonia synthesis is a reactor which closely approaches the ideal.

* * *

For a reaction rate high enough to produce profitable yields, a special temperature gradient must be maintained in the reactor. This requires extremely close control of temperatures throughout the catalyst beds—a job made more difficult by the fact that the exorthermic reaction occurs at a temperature near that at which catalyst activity begins to deteriorate rapidly and construction materials are threatened by accelerated corrosive attack.

* * *

Kellogg solved this problem with a reactor which employs layers of catalyst with provision for injecting quench between the beds. The result is a converter that effectively controls removal of the heat from the reaction zone, giving virtually point-by-point temperature control throughout.



Second Ethylene Plant to Use the Kellogg Pyrolysis Process is Now Going On Stream in Europe

Marking the second large scale commercial installation so far to employ Kellogg's exclusive steam pyrolysis process, a new ethylene plant is now going on stream near Milan, Italy. The plant is a part of a giant refinery modernization project Kellogg has undertaken for a well known chemicals producer. It includes a feed preparation section in which the heavy naphtha and gas oil feed stock is distilled from crude oil, a steam pyrolysis section in which the feed is cracked at high temperatures, and a recovery section which separates ethylene and other olefin products.

In addition to this plant, Kellogg is currently engaged in building another ethylene plant in England, the second such installation for the same producer. This plant, like its predecessor which Kellogg built three years ago, will utilize heavy naphtha for the primary production of ethylene which in turn will go into the manufacture of polyethylene.

Completion of the Italian plant, together with the other one underway, is indicative of a trend abroad which is expected to have more and more significance in the U. S.

Ethylene markets on both sides of the Atlantic have skyrocketed in the last few years. Forecasts are for even bigger demands in the not too distant future. In supplying these demands to date, U. S. producers have for the most part concentrated on cracking gaseous feeds—principally ethane and propane recovered from natural and refinery gases.

European producers, however, motivated by a lack of sufficiently large quantities of "crack-able" gases, have found it profitable to manufacture ethylene from heavier petroleum fractions. Important as a key to this movement—which was spearheaded three years ago by the British producer who built the first plant—has been Kellogg's steam pyrolysis design, developed specifically for such feed stocks.

The significance of this development to the domestic picture stems from several facts: First, the success of Kellogg's pyrolysis process has been proved in lengthy commercial operation to have superior advantages in high yields without excess coking. Second, the same principle can be adapted to the use of such feedstocks as casinghead or natural gasoline, re-

(continued on reverse side)

KELLOGG
ETHYLENE PROPYLENE BUTYLENE
KELLOGG
METHANOL ETHANOL PROPANOL
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CHEMICAL PROCESS NEWS

CONTINUED FROM PRECEDING PAGE

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siduals, and other low value products which tend to be in over supply in the U. S. And third, the principle is also adaptable to conventional feeds, where pilot plant studies have shown the process to have the same advantages in high yields and low coking that it has shown with heavier feeds.

Consequently, for domestic producers, this means the availability of a new, proved ethylene process which greatly enlarges the field of raw materials that can be processed economically. It offsets any dependence on the present price structure of natural gas, and it can also offset dependence on refinery product raw materials, for economic studies based on Kellogg pilot plant data indicate that crude oil, itself, can be profitably processed to yield a maximum of olefins.

High Conversion, High Purity Mark Steam Pyrolysis Process For Ethylene

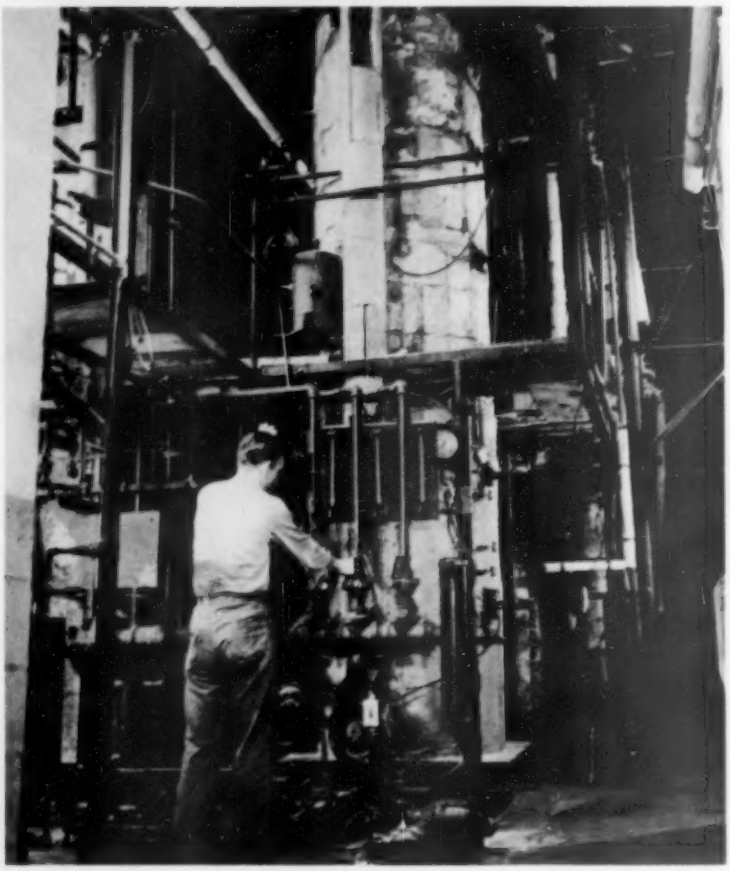
Kellogg's process for cracking petroleum feedstocks to produce ethylene employs a unique concept in the tailoring of petrochemical intermediates. This concept involves the use of superheated steam to: (1) supply heat for vaporization of the charge (in the case of a liquid feed); (2) reduce the partial pressure of the charge in the flash drum to a point that allows vaporization at a relatively low temperature, thus minimizing cracking in this step; and (3) to reduce the partial pressure of the charge in the high temperature pyrolysis step, thus insuring a higher rate of cracking of the feed and increased yield of olefins.

Results obtained with this process—both commercially and in exhaustive pilot plant studies—have been characterized by excellent yields of high purity olefins. In most instances, yields have exceeded any so far achieved using conventional cracking methods.

At the same time, it has shown a remarkable ability to suppress formation of coke in the furnace—one of the inherent disadvantages of conventional ethane and propane pyrolysis systems. Furnace coking in Kellogg's process has at no time been significant. Indications are that commercial plants using any of the possible feeds for olefin production could be operated continuously at high conversions without the need for spare cracking furnaces.

Economy of operation is attained by quenching after pyrolysis in waste heat boilers. When using the steam cracking process, full heat recovery at this point is achieved with only infrequent bypassing for cleaning of quench boilers. During normal operation, the boilers provide all the process steam required for the pyrolysis step.

Ethylene Pilot Plant Studies Continue



This is a view of the pilot plant in Kellogg's Jersey City laboratories where continuing studies are being carried out using various adaptations of the steam pyrolysis process to make ethylene from ethane, propane, and other feed stocks. Petroleum residuals and low value liquid fractions have also been studied extensively, and indications are that production of ethylene from crude oil itself would be an economically feasible operation.

For further information, technical data, etc., relating to chemical or petrochemical processing, write

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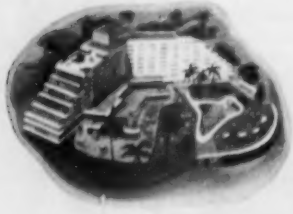

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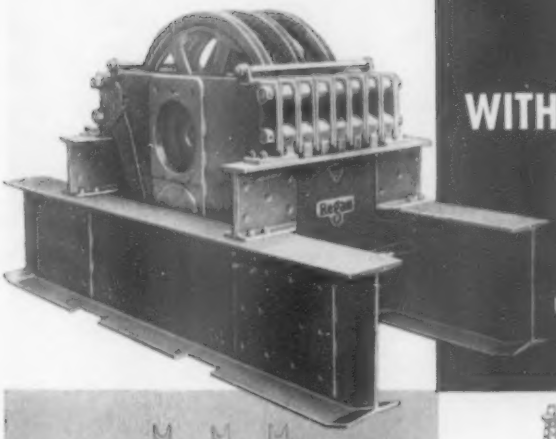
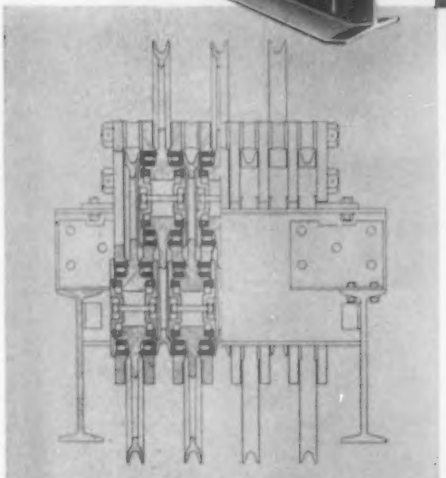
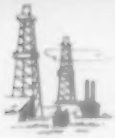




MOUNTING ARRANGEMENT of Aetna radial roller and ball thrust bearings in Regan's AN 55, seven-sheave, 600 ton capacity crown block. Roller bearings have complement of 28—1 ¼" dia. x 1½" long rollers; radial load capacity of 115,700 lbs. @ 10 R.P.M.—38,570 lbs. @ 270 R.P.M. Thrust bearings have laminated phenolic retainers with 28—¾" balls; thrust load capacity of 50,270 lbs. @ 10 R.P.M.—16,750 lbs. @ 270 R.P.M.



The Regan Forge and Engineering Company's model AN 55 Crown and Traveling Blocks were designed specifically to handle the increased wire line speeds of today's larger, more powerful drawworks.

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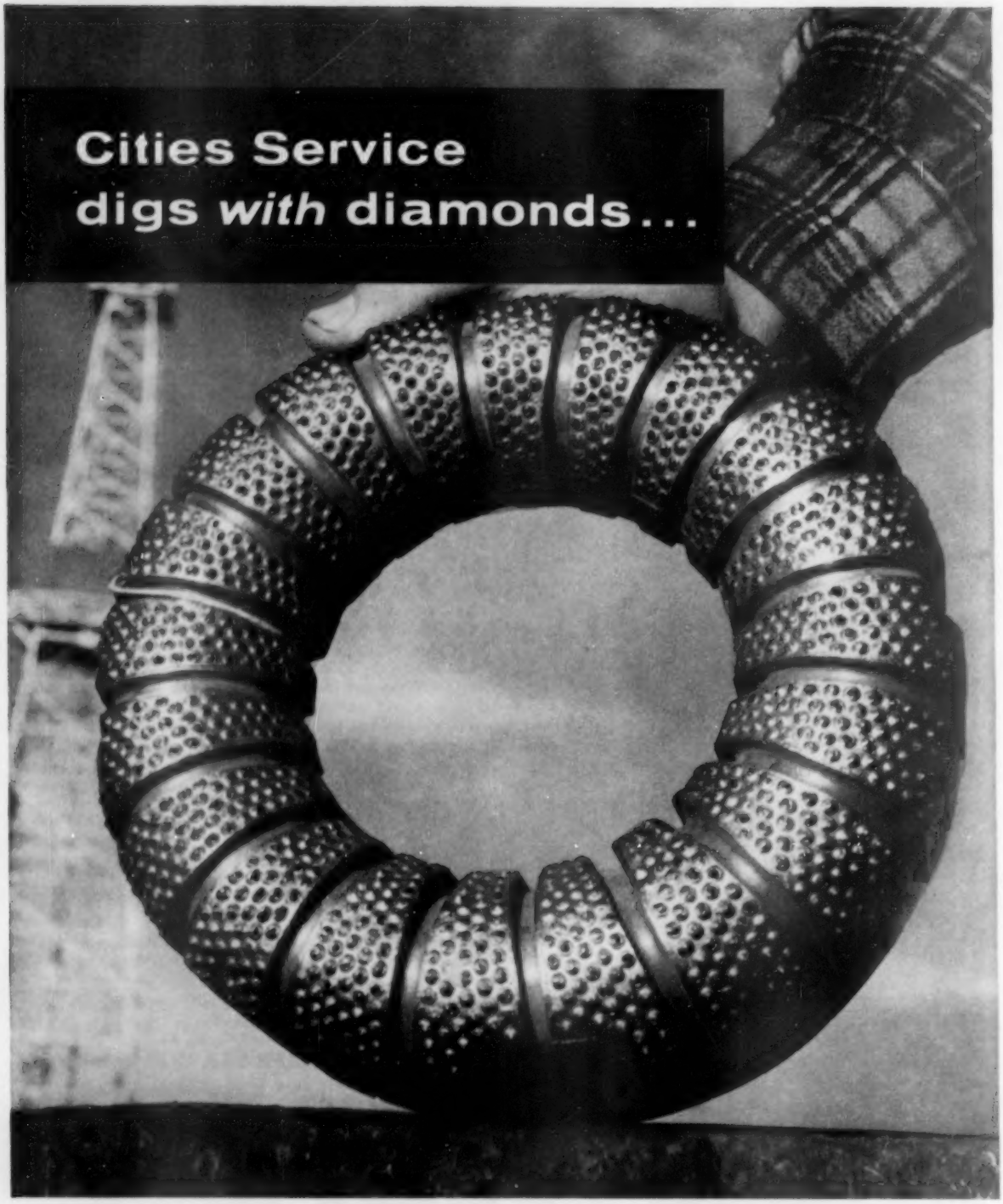

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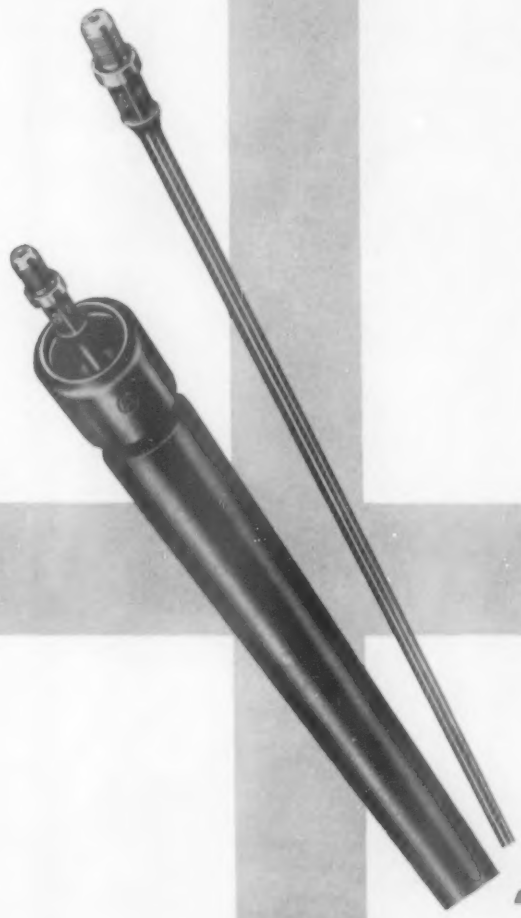

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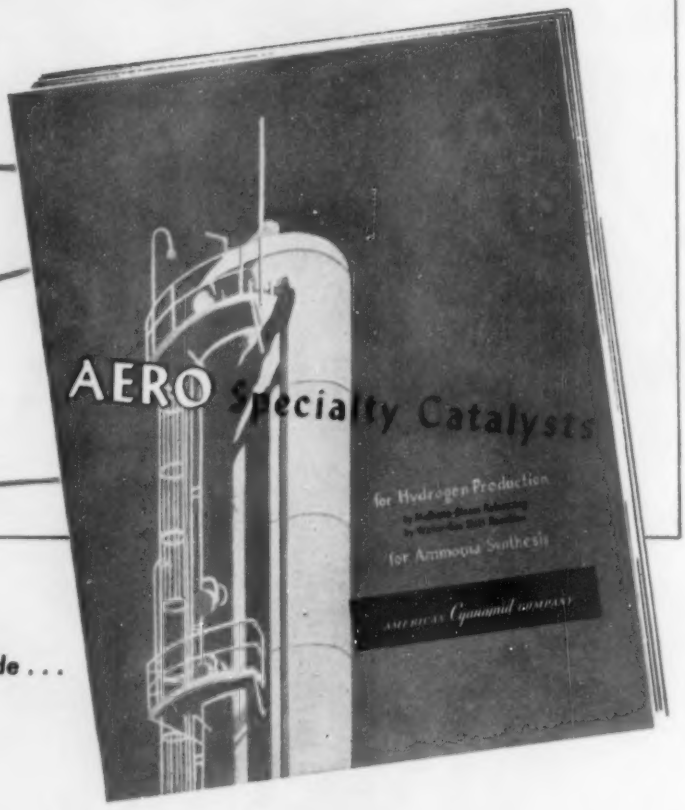

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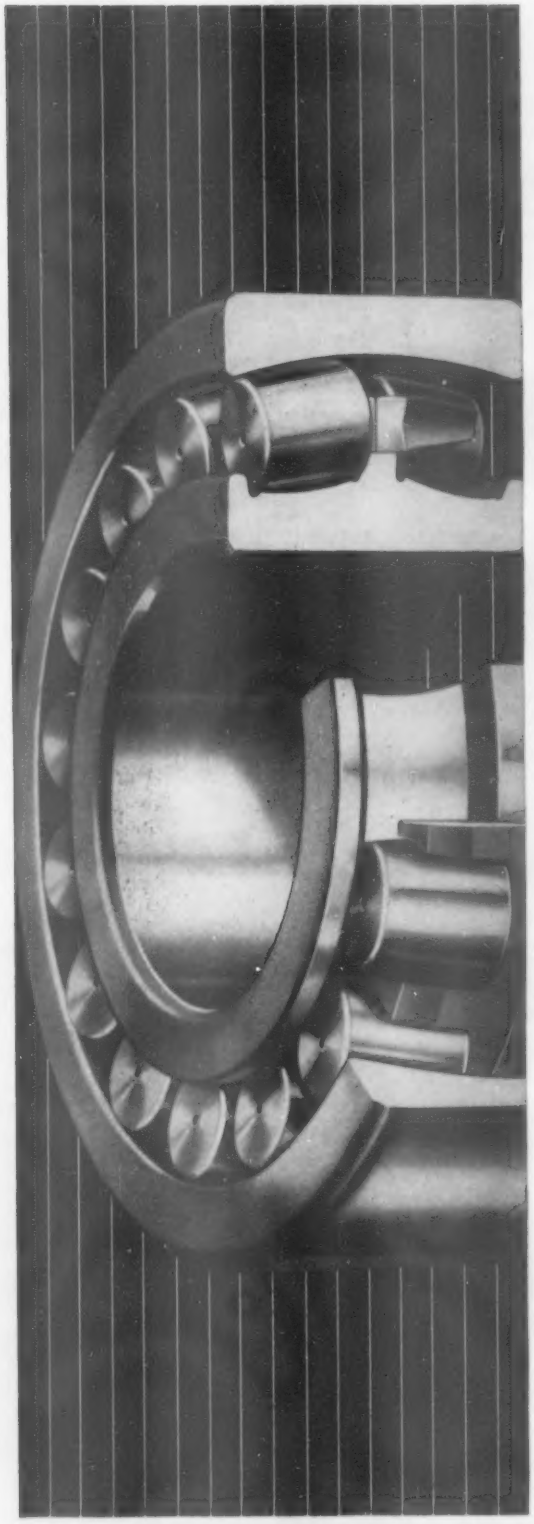

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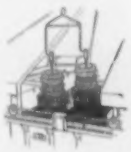

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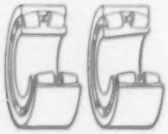

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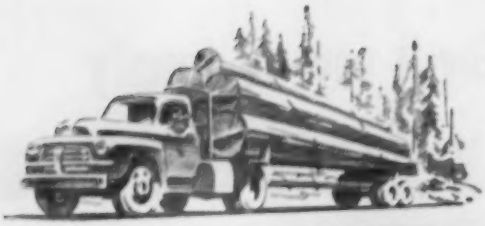

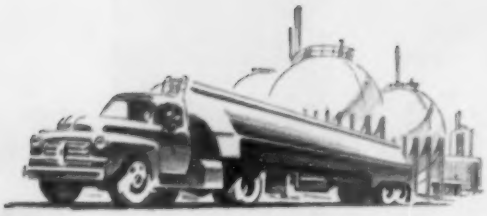

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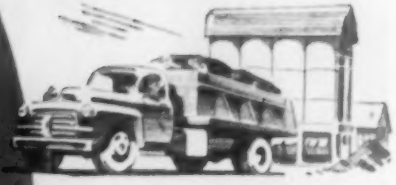

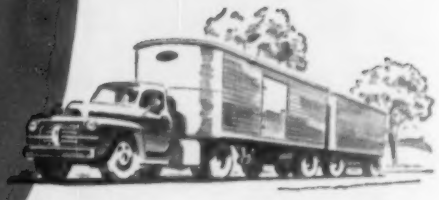

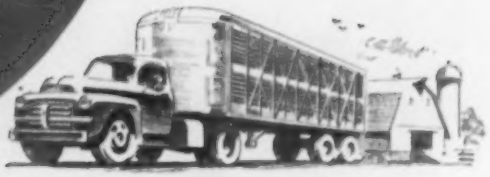

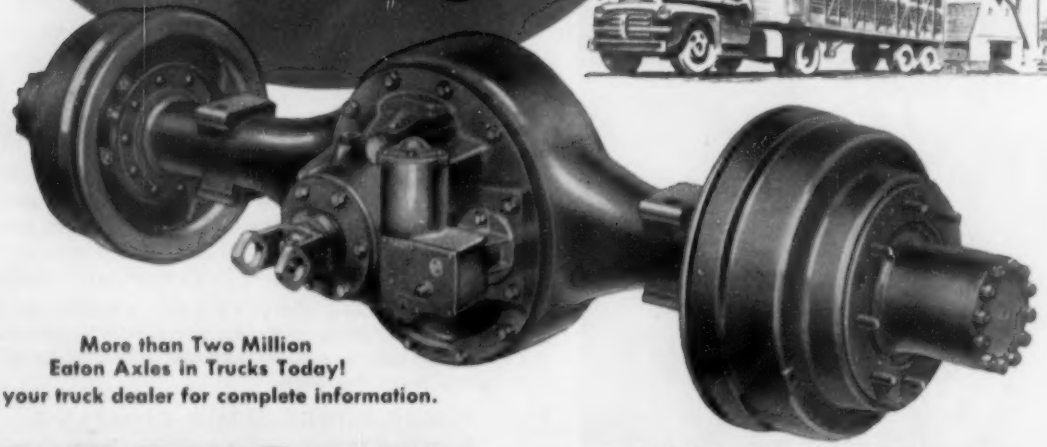

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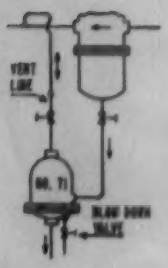
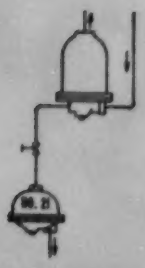
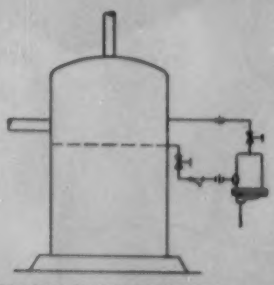


DRAINING WATER from separator in compressed air or gas line with No. 71 "snap-action" trap.



COMPRESSED AIR separator drainage with No. 21 Armstrong trap for use with small compressors.



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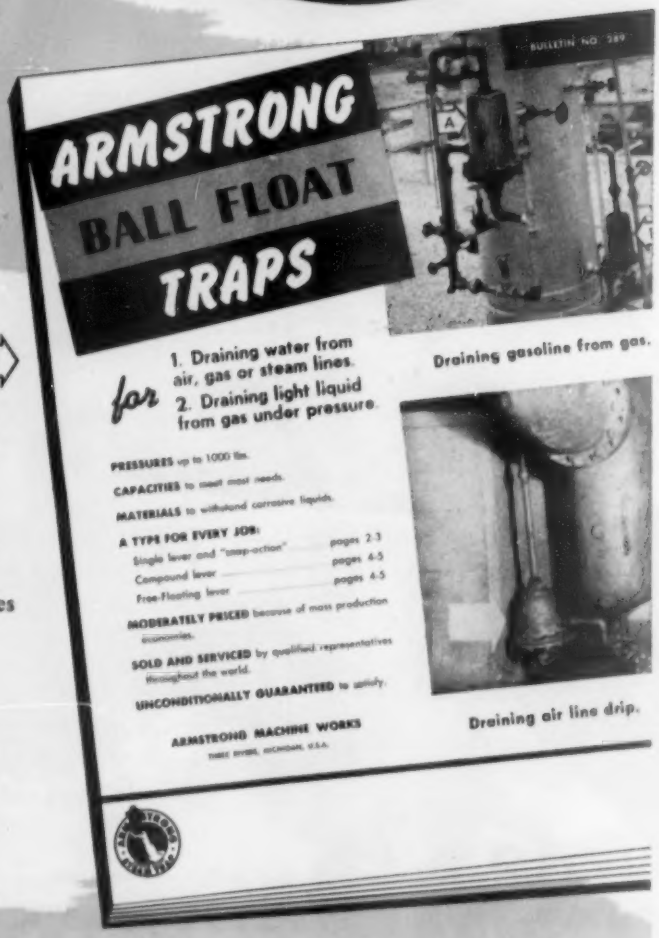
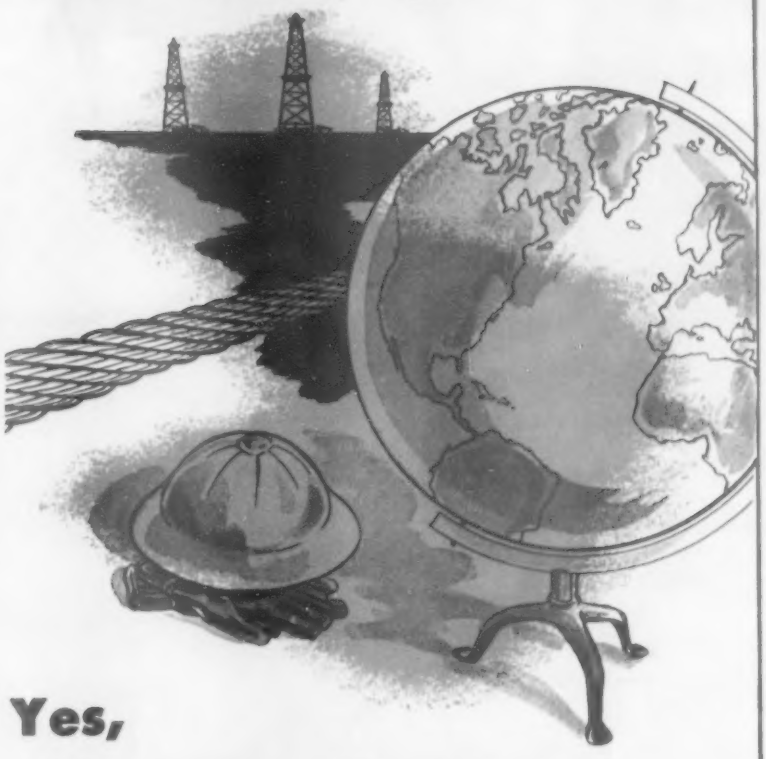
Makers of Armstrong Inverted Bucket Steam Traps


ARMSTRONG
BALL FLOAT
TRAPS
for
1. Draining water from air, gas or steam lines.
2. Draining light liquid from gas under pressure.
PRESSURES up to 1000 lbs.
CAPACITIES to meet most needs.
MATERIALS to withstand corrosive liquids.
A TYPE FOR EVERY JOB:
Single lever and "snap-action" pages 2-3
Compound lever pages 4-5
Free-Floating lever pages 4-5
MODERATELY PRICED because of mass production economies.
SOLD AND SERVICED by qualified representatives throughout the world.
UNCONDITIONALLY GUARANTEED to satisfy.
ARMSTRONG MACHINE WORKS
THREE RIVERS, MICHIGAN, U.S.A.
BULLETIN NO. 289
Draining gasoline from gas.
Draining air line drip.

ARMSTRONG *Ball Float* TRAPS

LeBus Grooving?



Yes, Wherever there's Oil . . .

From the jungles deep in South America, to the cold, icy regions of Northwest Canada and in the deserts of the Near East . . . Wherever there's oil . . . there's LeBus Grooving and Wire Line Spooling. No other single service has ever been accepted so rapidly, by the drilling industry, as the LeBus Grooving and Wire Line Spooling service. LeBus Pioneered and Scientifically Engineered the grooving and spooling of wire line on drilling rig drums and today has sales and service centers in every part of the oil country to more rapidly install this service, as needed, or answer any questions regarding LeBus Grooving and Wire Line Spooling Service. Call your nearest LeBus Engineer today . . . let him show you how this service can save you valuable drilling time and money.

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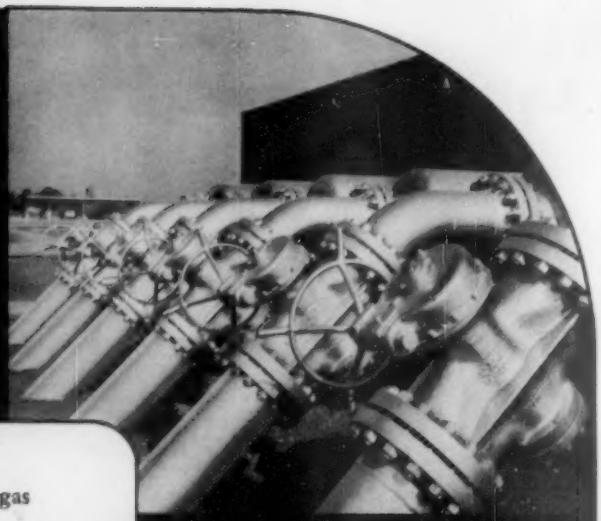
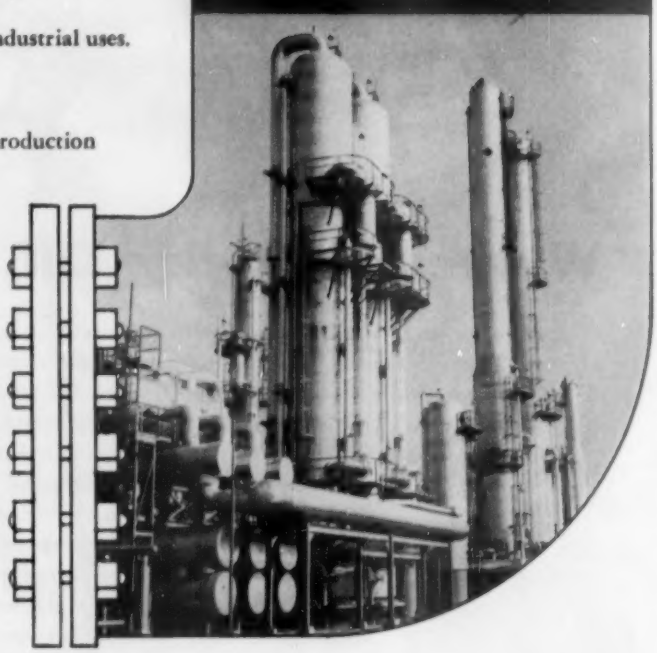
400 Million Cubic Feet of Natural Gas Pass Through These Pipes Every Single Day!



National Petro-Chemicals Corporation Plant, Tuscola, Illinois

Every day 400,000,000 cubic feet of natural gas pass through the main inlet pipes of the world's largest petro-chemical plant. This is the raw material that is transformed into diverse petro-chemical products for countless industrial uses.

The complex facilities for such vital production demanded extensive design, engineering and construction experience. Pritchard supplied this experience for the Tuscola plant as the major contractor on the job. Such tangible evidence is proof that Pritchard can meet your specific needs.



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CHICAGO • HOUSTON • NEW ORLEANS • NEW YORK
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Butyrate pipe is light

Tenite Butyrate pipe weighs only 1/12th as much as cement-lined metal pipe. One man can easily carry three 20-foot lengths of 4" Tenite pipe.

Butyrate pipe is easy to join

Joining Tenite Butyrate pipe in the field is fast and easy. You just solvent weld slip-sleeve couplings to the pipe ends. Your only "tool" is a paint brush.

Butyrate pipe resists corrosion

Buried or exposed to the weather, Tenite Butyrate pipe eases corrosion problems because it resists salt water, sour crudes and electrolytic soils.

Could these advantages of Tenite Butyrate help you?

REMEMBER WHEN corrosion and paraffin clogging were two inescapable problems for pipe lines? They're not today, though. Oil men have found that pipe made of Tenite Butyrate resists all the corrosion encountered in oil fields. And in high-paraffin crude lines where metal pipe would have to be cleaned more than once a week, Tenite Butyrate pipe remains clear with few, if any, shutdowns necessary.

Tenite Butyrate pipe offers many advantages over metal pipe and has proved itself in all types of fields for several years. Today, the question no longer is, *"Will Butyrate pipe do the job?"* but rather, *"When will you give Butyrate a chance to do the job?"*

For further information and technical help in adapting long-lasting Tenite Butyrate pipe to your operations, write: EASTMAN CHEMICAL PRODUCTS, INC., Kingsport, Tennessee, subsidiary of Eastman Kodak Company.

TENITE
BUTYRATE
an Eastman plastic

EASTMAN CHEMICAL PRODUCTS, INC.

KINGSPORT, TENNESSEE

Please send me information on TENITE BUTYRATE PIPE and a list of companies manufacturing Tenite pipe and fittings.

NAME_____

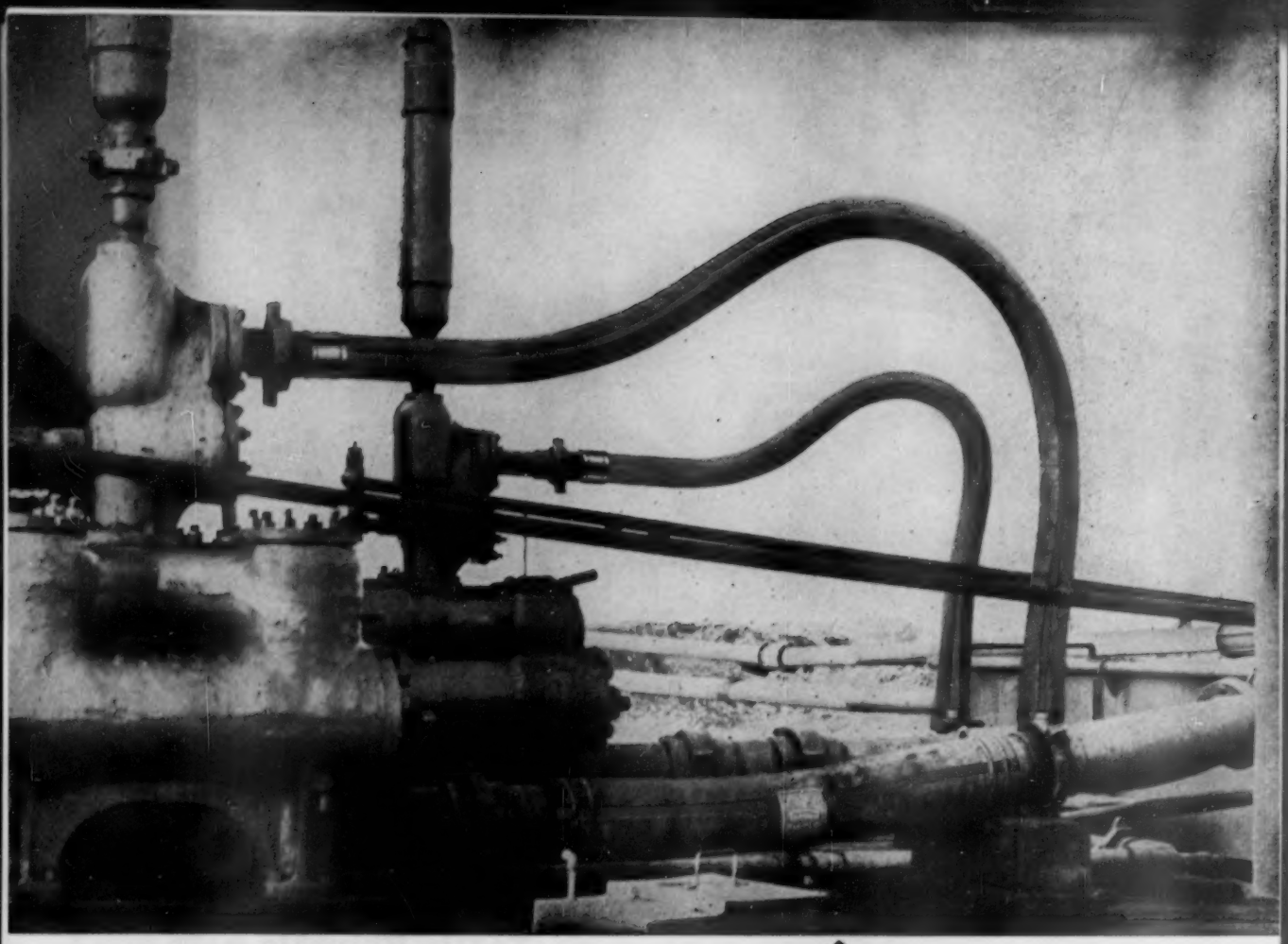
POSITION_____

COMPANY_____

STREET_____

CITY_____ STATE_____

OG-1254



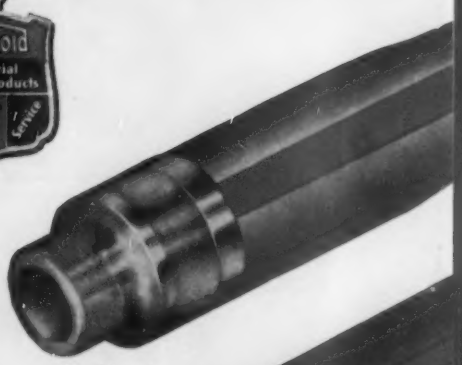
Thermoid Oil Field Products Are Built for Rugged, Continuous Service ...to Cut Your Drilling Costs

Thermoid Flexible Discharge Units provide rugged high pressure connections between mud pump and standpipe . . . eliminate sharp angle fittings, thus reducing turbulence and loss of pressure. Easily installed, they take up misalignment, save rig up and tear down time, resist vibration, cut time lost due to pipe breakage and loosened connections. Full flow pressure seal couplings are built in. Supplied in diameters of 2½", 3" and 3½" . . . standard lengths. Pre-tested to 5000 psi to assure blowout-proof performance.

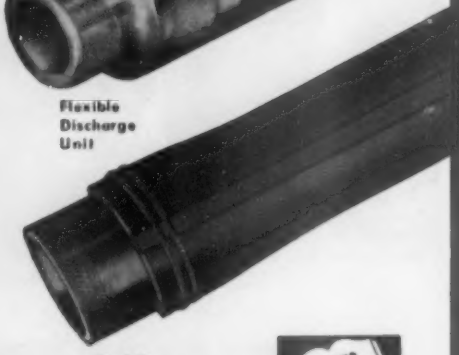
Thermoid Mud-Flo Suction Hose absorbs pumping vibration and affords maximum flexibility. Thick inner tube and heavy galvanized wire reinforcement imbedded in rubber compound prevents collapse and provides unobstructed flow. Permits changing position of intake without changing connections. Cover withstands abrasion and weathering. Ends are sealed to help keep out moisture.

To keep your costs down, be sure you specify Thermoid Flexible Discharge Units and Mud-Flo Suction Hose.

Mid-Continent Offices and Warehouse, Houston, Texas
California Offices and Warehouse, Los Angeles



Flexible Discharge Unit



Mud-Flo Suction Hose

SEE OUR CATALOG IN THE COMPOSITE CATALOG

Powerflex Rotary Hose • Trioflex Slim-Hole Rotary Hose • Mud-Flo Slush Pump Hose • Flexible Discharge Units • F.H.P. and Multiple V-Belts • Oil Country Flat Belting

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Wire Line Turn Backs • No-Wip Line Savers • Stuffing Box Rings • All Types of Hose • Molded Specialties • Brake Blocks

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For Intermittent Service
You Can't Beat this Welder

You Can't Beat its Price

You Can't Beat
its Performance

New P&H TI-295 295-amp AC Welder

...the only low-cost intermittent-type welder that can handle low-hydrogen and stainless-steel electrodes

Here's a low-cost welder—with a rated load and duty cycle as follows: 295 amps, 20%; 250 amps, 30%; 200 amps, 50%.

Wide Range — You can go from 25 amps to 295 amps. You can use this machine on light-gauge material, as well as on heavy plate.

No Arc Booster — Just think — you get an open-circuit voltage of 75 volts. This means — you can weld with low-hydrogen or stainless-steel electrodes. No other welder that sells for the low price of the TI-295 can do this. Arc-striking is easier and electrode-sticking eliminated.

Exclusive P&H Dial-lectric Control — You get sound, uniform welds because all you have to do is turn a radio-like knob to get exactly the heat you need. The amperage adjustment is creep-proof too — you set the heat and it stays. Changing heat is only a matter of a second or two — a three-quarter turn of the knob is all that's required to go from minimum to maximum capacity.

No hard-to-work crank to turn. No moving parts — no moving coils or cores, no worm gears or sprockets, chain or lever adjustments. This means there's less wear, less maintenance, *less noise*—nothing to bind or "freeze" from rust.

Contact your P&H representative or distributor — see how easily the new P&H TI-295 outperforms other welders in this class.

P&H WELDING DIVISION
HARNISCHFEGER CORPORATION
4527 W. National Ave., Milwaukee 46, Wis.

the P&H Line

P&H Welding equipment is manufactured and sold in Canada by
REGENT EQUIPMENT MANUFACTURING COMPANY LTD. • 455 King Street West • Toronto, Ontario, Canada

for VERSATILITY *and*

To Almost Any FIELD TREATING PROBLEM

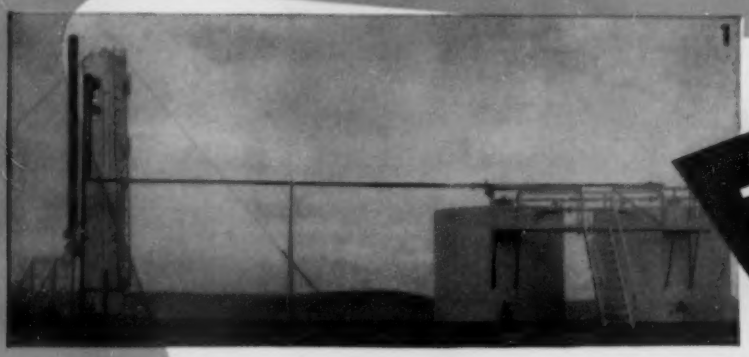


Photo 1 shows a Type "S" Treater being used as an atmospheric vessel—that is, with no water, oil or gas valves required—because there is no gas in the formation being produced. Commercial fuel gas is used for firing the treater. The overhead flow line from treater to stock tanks is slightly inclined to assist the flow of the low gravity Arbuckle oil, especially during cold weather.

Photo 2 shows a Type "S" Treater being used in low pressure service with water, oil and gas valves installed—but still using an inclined overhead flow line from treater to tanks, because the small amount of gas in this formation is separated by the treater and is used for fuel gas. This set-up is used many times when initial wells come in without gas, and subsequent wells produce gas. The treater is originally installed as an atmospheric unit, and is later equipped with valves to handle gas found in subsequent drilling.

Conversely, some areas may have 2 or 3 million feet of gas flow when drilled in, but due to the small reserve, the gas supply is depleted in a relatively short time. In these circumstances, it is a common practice to install valves on an inclined flow line from the treater. This makes it possible to handle large amounts of gas when wells are first drilled. As the gas is depleted, the valves are removed and the treater is used as an atmospheric unit.

Photo 3 shows a 4' x 21' Type "S" Treater in conventional service with water, oil and gas valves installed near the ground. Because of sufficient gas pressure and reserves, and because the oil is of high gravity and does not present a flow problem, the flow line is underground with a riser line at the stock tanks.

This unit has been handling 20 bbls. of flowing oil per hr. @ 90° F. rise in temperature, with approximately 2MM-SCF of gas per day. Pipe line oil has been produced *without interruption* since the well was opened. Other nearby operators with the same conditions who installed separators, heaters and flow tanks at considerably higher initial cost were *not able* to continuously produce pipe line oil. They later found it necessary to re-equip with flow treaters.

ADAPTABILITY...

.....Specify the BS&B Type "S" EMULSION TREATER!

The BS&B Type "S" Emulsion Treater is one of the most versatile and adaptable treaters ever built for handling a wide range of field treating problems, because of the simple field modifications which can be made to adapt it quickly and inexpensively to local operating conditions!

It can be operated:

1. With or without water, oil and gas valves (as a pressure or an atmospheric unit).
2. With inclined overhead flow line, or with underground flow line.
3. With up to 6 ft. of hay filter section, or without hay filter section.
4. Without firebox, but with hay filter section (for heatless treating).

During the past five years, this unit has performed with outstanding success in all sections of Kansas, as well as in other widely varying locations, under the following range of conditions:

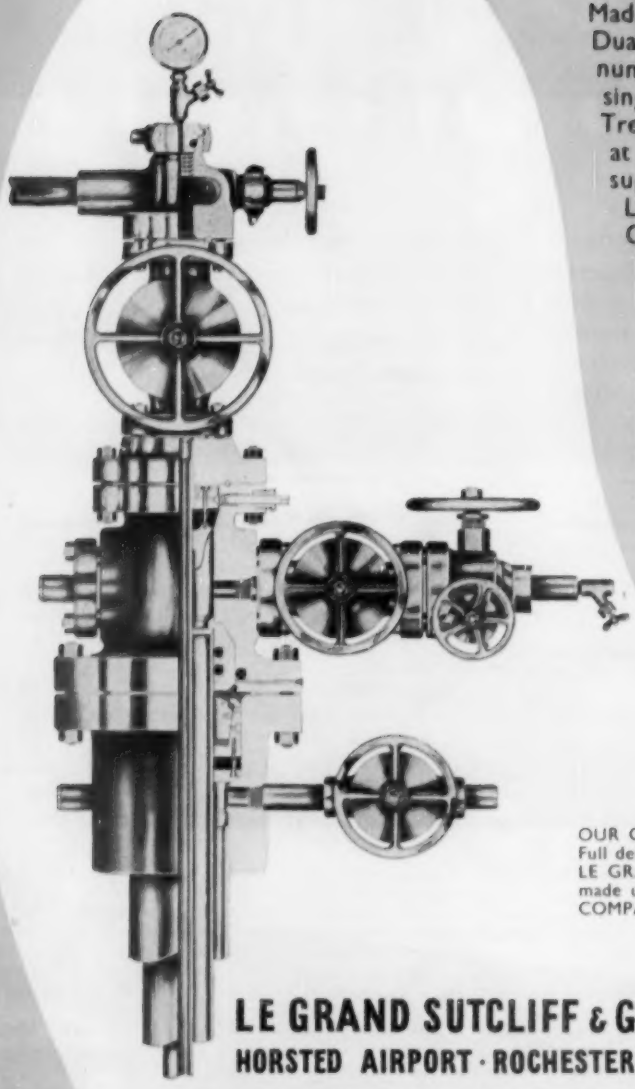
1. 17° API dead Arbuckle Oil w/1.004 Salt Water. (This oil congeals at high temperature.)
2. 19° API Kansas City Oil w/entrained gas and 1.005 Salt Water.
3. 42° API and over w/gas — (difficulty caused by small quantities of water, flow-cut into the oil.)
4. Mixtures of low gravity Arbuckle Oil and high gravity Kansas City Oil, or vice versa.

If you'd like more information on the BS&B Type "S" Emulsion Treater, or on any other item of BS&B Oilfield Production Equipment, call your BS&B Representative or write to...

BLACK, SIVALLS & BRYSON, INC.
Oil & Gas Equipment Division, Dept. 1-A12
1708 West Main Street — Oklahoma City, Okla.

EFFICIENCY OVER 60 YEARS BS&B RELIABILITY

Wherever Flow Control is Vital



LE GRAND O.C.T. Flow Controls represent the latest development in Christmas Tree equipment. Made in two types (Single and Dual) **ONE** unit replaces the numerous parts of a conventional single or double arm Christmas Tree with **INCREASED** efficiency at **HALF** the price. Full details supplied on request.

Like all other LE GRAND O.C.T. Well-head Equipment, LE GRAND O.C.T. FLOW CONTROLS are manufactured in ENGLAND under licence from The OIL CENTER TOOL CO. of Houston Texas. Materials comply with A.P.I. Standard specifications and all components and spares are interchangeable with similar equipment manfactured in the U.S.A.

OUR OTHER PRODUCTS:—
Full details of LE GRAND Pumping Units and LE GRAND O.C.T. Well-head Equipment as made under licence from OIL CENTER TOOL COMPANY will be gladly sent on request.

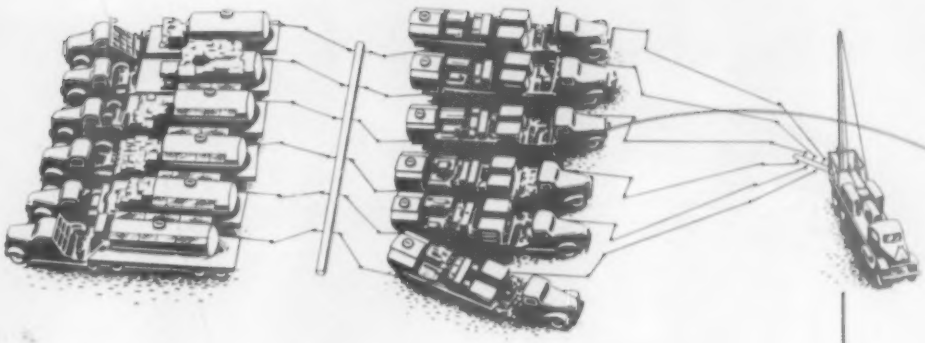
LE GRAND SUTCLIFF & GELL LIMITED.

HORSTED AIRPORT · ROCHESTER · KENT · ENGLAND

Represented in the following areas by agents who will be pleased to assist you:—

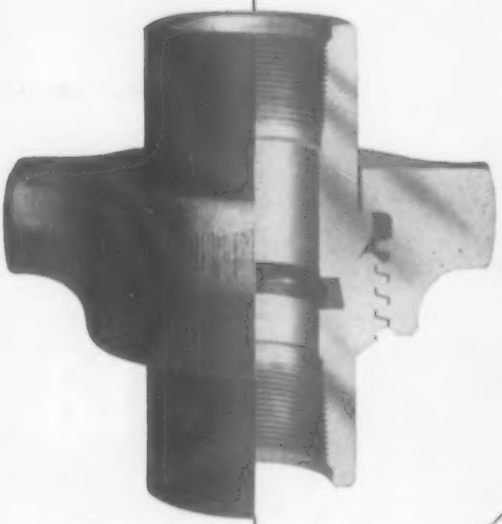
TRINIDAD :—	EASTERN VENEZUELA:—	WESTERN VENEZUELA:-
The Industrial Agencies Ltd., 14 High Street, San Fernando.	A-Z Export S.A., Apartado 4026, Puerto La Cruz.	A-Z Export S.A., Apartado 304, Maracaibo.

LE GRAND



HERE'S A REAL TEST OF SERVICE...

and WECO UNIONS are *more than* equal to it!



There's no place for weaklings in cementing, acidizing, formation fracturing and similar service operations. That's why WECO Unions are used by companies performing these oil well services. They need a union that makes-up and breaks-out fast—that seals securely time after time—that will withstand long, hard service. WECO Unions are giving service companies this kind of service. The protected* ball and cone seat seals and holds high pressures, corrosive and abrasive fluids on job after job. Their extra strong subs and nuts, precision machined and finished, meet the rigid requirements of service companies. Wherever you need a Union, you need a WECO Union and there's a size and pressure for every service.

* Resilient seal ring in
Fig. 402, 4,000 psi. Fig. 1002, 10,000 psi.
Fig. 602, 6,000 psi. Fig. 1502, 15,000 psi.

PESA
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION
PARTNERS IN PETROLEUM PROGRESS

it's wise to standardize with.. **WECO**

WECO®

WELL EQUIPMENT MFG. CORP. • Division of Chiksan Company • HOUSTON 1, TEXAS

When you buy welding elbows . . .

Why take less when you can get more?

. . . (and at the same price)

ADVANTAGES OF MIDWEST "LONG TANGENT" ELBOWS

- ★ They save pipe.
- ★ They often eliminate short nipples and their extra welds.
- ★ They save time and money in lining up and clamping pipe and fitting.
- ★ They make it easier to apply slip-on flanges.
- ★ They remove the circumferential weld from point of maximum stress and can be sleeved.
- ★ THEY COST NO MORE THAN OTHER ELBOWS.

As shown in the illustration above, Midwest "Long Tangent" welding Elbows have straight ends equal to ¼ of the nominal fitting diameter (a 12" elbow has tangents 3" long). For the reasons listed at the left, substantial savings are made on many piping systems by using Midwest "Long Tangent" Elbows. For more information about them, write for Catalog 54.

MIDWEST PIPING COMPANY, INC.

Main Office: 1450 South Second Street, St. Louis 4, Mo.

Plants: St. Louis, Passaic, Los Angeles and Boston

Sales Offices:
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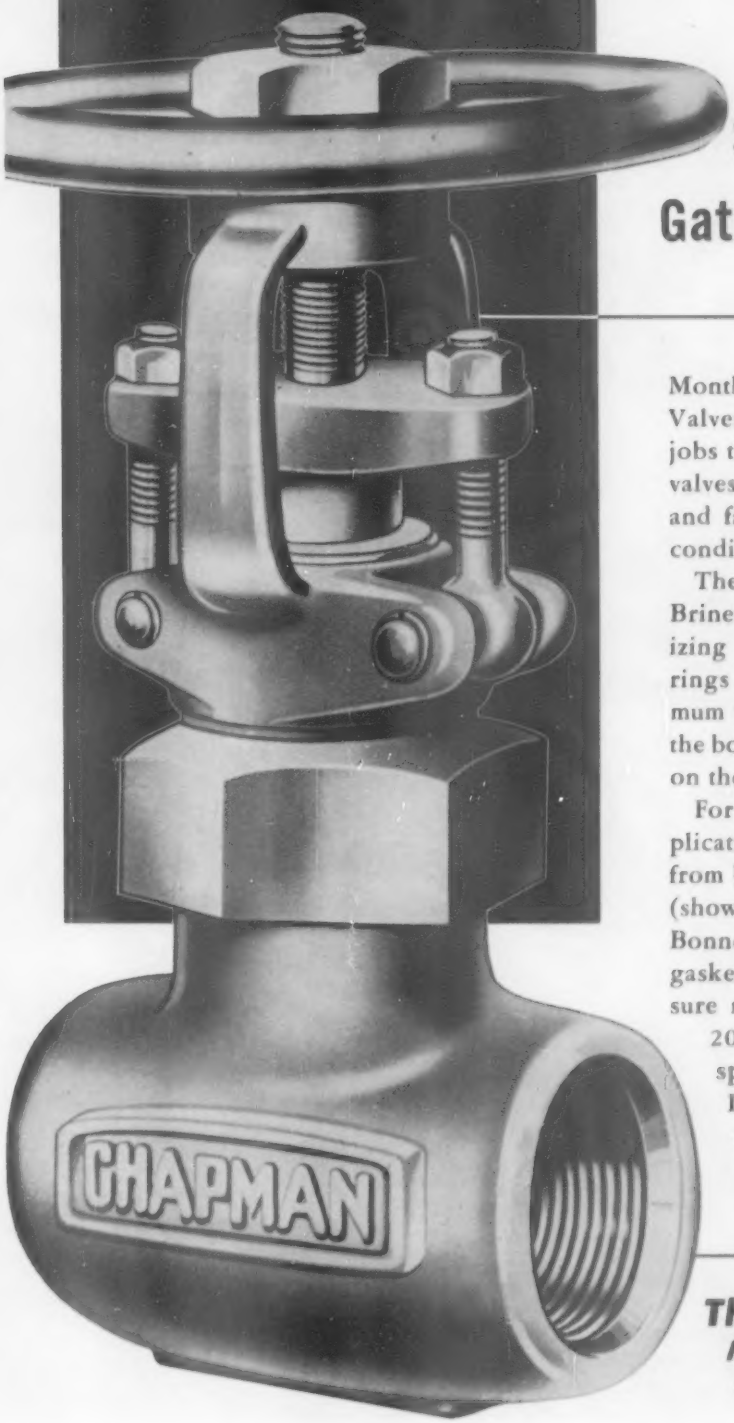
MIDWEST WELDING FITTINGS IMPROVE PIPING DESIGN AND REDUCE COSTS

Chapman List 960



...for EVERY Small Forged Steel Gate Valve Application

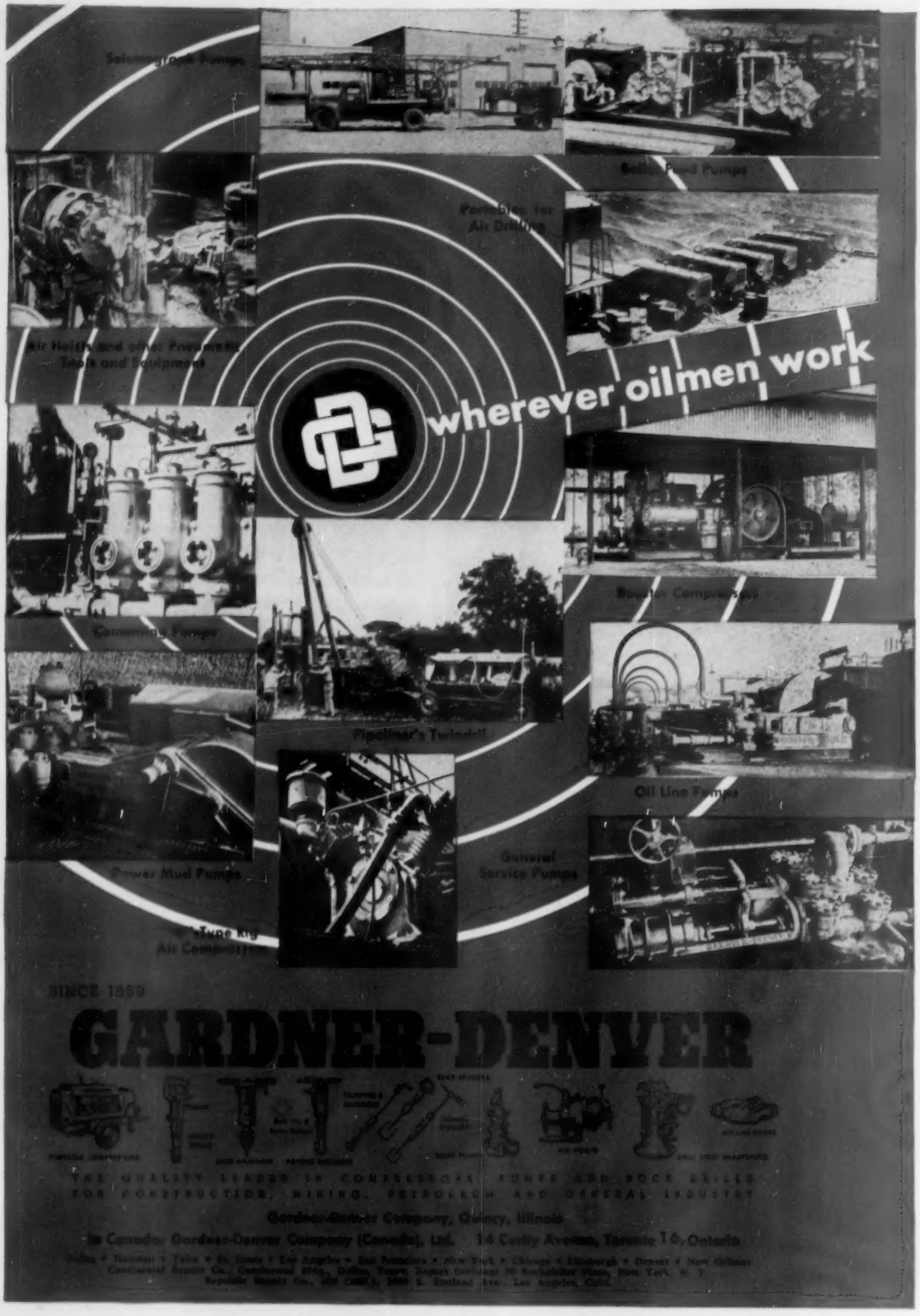
Month after month, Chapman List 960 Valves deliver the goods on more different jobs than any other small forged steel gate valves. And maintenance charges are few and far between even under the toughest conditions.

The wedge gate faces — hardened to 800 Brinell by Chapman's exclusive Malcomizing process — won't seize or gall. Seat rings are hardened stainless steel, for minimum wear, and are easy to replace. Also, the bolted follower has no exposed threads on the yoke to corrode.

For every small forged steel gate valve application, specify Chapman List 960. Sizes from ¼" to 2", either rising stem with yoke (shown) or rising stem with inside screw. Bonnet joint is ground metal-to-metal or gasketed, depending on application. Pressure range is from 380 psi at 1000°F to 2000 psi at 100°F. For higher ratings, specify List 990.

List 960 is made in various alloys and combinations of alloys as listed in Catalog No. 10. Write for your copy today.

The CHAPMAN Valve Manufacturing Company
INDIAN ORCHARD, MASSACHUSETTS


wherever oilmen work
SINCE 1859
GARDNER-DENVER
THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS
FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY
Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd. 14 Curity Avenue, Toronto 16, Ontario

Case No. 64

Kemp Dryer Assures Accuracy For Sun Oil Co.

How SUNOCO guarantees dependable instrument readings 24 hours a day

WHEN the Sunoco Plant at Marcus Hook, Pa., introduced a new process at the beginning of the year, many new instruments were installed. To dry the compressed air operating these instruments and assure accurate readings, Sunoco installed a Kemp Model 300 S Dryer

Kemp Dryer Entirely Satisfactory

According to Harold Powers, Instrument Supervisor at Sunoco, the Kemp Dryer has been entirely satisfactory in performance. Operating continuously day and night since installation, it has performed according to specifications, has never been saturated, and has required very little attention.

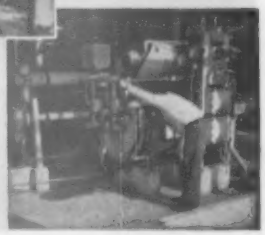
Kemp Dryers for Every Purpose

Kemp offers a variety of dryer models to meet all problems. Designed to dry air to sub-zero dew points at low cost, they are constructed of quality materials and embody the engineering knowledge gained from Kemp's many years of experience. They are available with manual, semi-automatic, or fully automatic tower reactivation. In addition, Kemp will prescribe the proper desiccant for each specific drying job. If you have a problem involving the removal of water from air, gases, or liquids, contact Kemp engineers now.

KEMP INERT GAS GENERATORS, too, serve Sunoco well

Sunoco reports that its two Kemp Inert Gas Generators have given highly satisfactory service. They are easy to start, and then operate automatically, requiring little attention. Both deliver high volume of gas of the proper analysis regardless of demand.

Kemp Inert Gas Generator Model C-5 MIHE. Delivers N_2 and CO_2 used to blanket top of wax tank.



Kemp Inert Gas Generator Model 8 MIHE. Produces N_2 and CO_2 for blanketing and for bubbler systems. Located in the open.

For more complete facts and technical information, write for Bulletin D-27 to:
THE C. M. KEMP MFG. CO., 405 East Oliver Street, Baltimore 2, Md.

KEMP OF BALTIMORE

DYNAMIC DRYERS

CARBURETORS • BURNERS • FIRE CHECKS
METAL MELTING UNITS • INERT GAS GENERATORS
SINGERING EQUIPMENT

The powerful HD-15, with 8-foot wide 15X blade, handles the biggest, toughest slush pit and dirt-moving jobs, clears land, moves drill rigs, tows or winches heavy equipment.

ALLIS-CHALMERS HD-15 TRACTOR WITH CHOICE OF DRIVES, AND BAKER 15X NO-PUSH-BEAM DOZER

Standard Transmission
109 drawbar hp, Weight approx., 32,400 lb with dozer

Torque Converter Drive
135 net engine hp, Weight approx., 32,900 lb with dozer

TWO OIL FIELD SPECIALS—

Allis-Chalmers HD-9 and HD-15 Tractors equipped with special 8-foot wide, no-push-beam dozers are designed specifically for oil field use.

Dozer blade mounts directly to the front of the tractor main frame. This direct-to-frame mounting is made possible by the Allis-Chalmers box A-type main frame. Since this frame is a one-piece, all-welded structural unit, inside push beams and heavy, expensive, obstructing braces are eliminated. Tractor main frame-dozer combination is raised and lowered as a single unit by side-mounted hydraulic rams that anchor to truck frames.

Look at the advantages this new type tractor-dozer design gives to oil field users — higher clearance for sure going in mud, muck, and rough terrain; steeper penetration angle, greater maneuverability, better balance and traction because blade is mounted close to tractor; and greatly increased track oscillation. With no push beams the 9X tractor-dozer is 1,650 lb lighter than with standard blade; the 15X is 2,000 lb lighter. Less weight means lower original cost, lower maintenance costs, plus high-output performance.

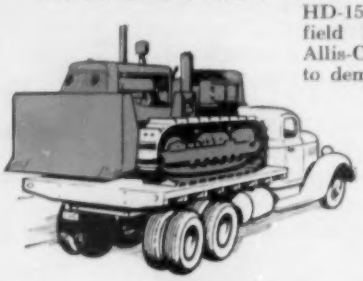
Slush Pit Naturals

These oil field specials, with 8-foot wide blades and steep penetration angle, permit operator to dig slush pits better and faster with shorter, steeper ramps. You'll also save time building access roads and fire walls, leveling drill sites, backfilling, and on dozens of tough digging jobs.

No Transport Permit Needed

The 8-foot, highway-wide blade means you can transport either of these tractor-dozer units night or day at a moment's notice — without special permit.

Get firsthand evidence. See the Allis-Chalmers HD-9 or HD-15 with these modern oil field blades in action. Your Allis-Chalmers dealer is ready to demonstrate.



8-foot blade width for permit-free highway transport

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

ALLIS-CHALMERS HD-9 TRACTOR AND BAKER 9X NO-PUSH-BEAM DOZER

72 drawbar hp
Weight approx., 21,700 lb with dozer
6 speeds forward, 3 reverse

The 72-drawbar hp HD-9 and 9X dozer offers outstanding, time-saving performance in digging narrow, deep slush pits — yet has the versatility to handle a wide range of oil field dirt-moving jobs.

DAVISON M-S® Catalyst

The Petroleum Industry's MOST WIDELY USED CATALYST!

- Narrow range of particle size distribution
- Low impurities
- Outstanding physical and catalytic characteristics
- Excellent attrition resistance

These are some of the reasons why Davison's Catalysts are the most widely used synthetic cracking catalysts in the petroleum industry. Throughout the world, Davison's catalysts crack more gas oil than any other catalyst.

Write today for a folder giving all the facts on Davison's M-S Catalysts . . . particle size distribution, chemical, physical and catalytic properties, etc.

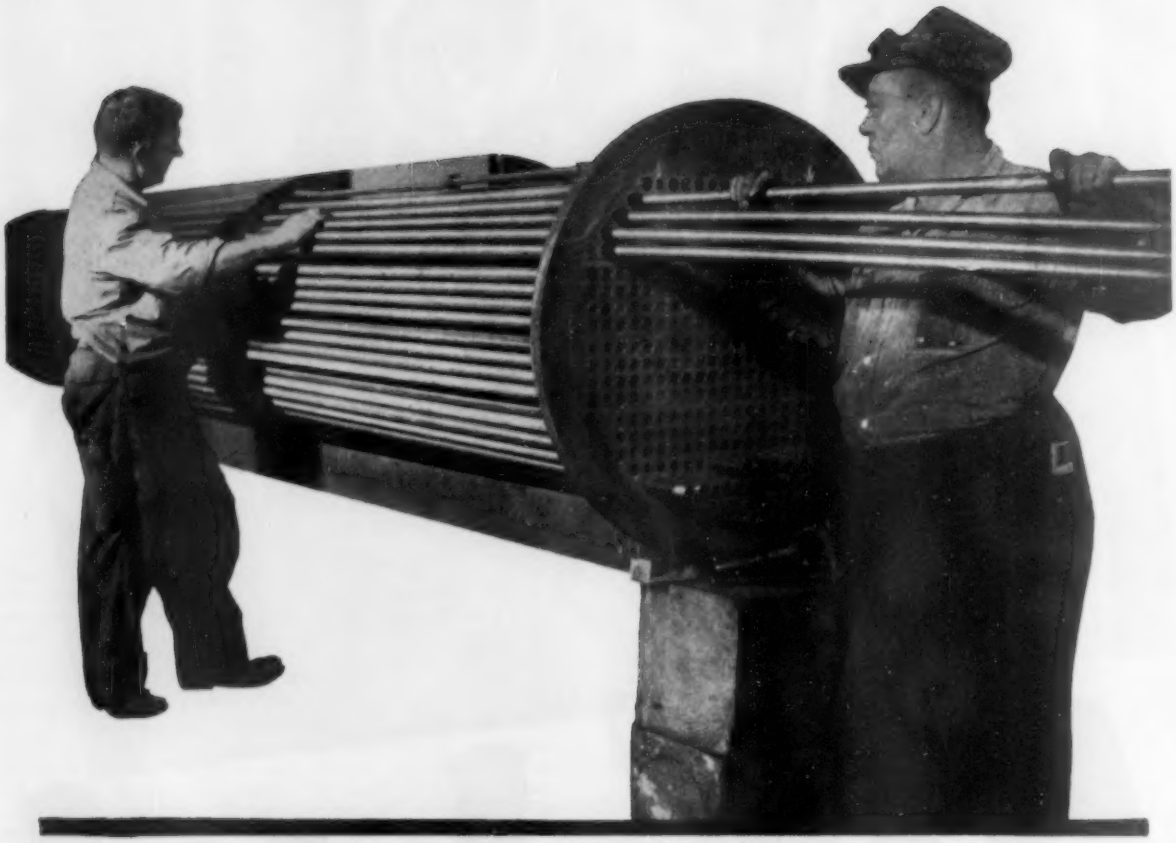
Progress Through Chemistry

DAVISON CHEMICAL COMPANY
Division of W. R. Grace & Co.
Baltimore 3, Maryland
Sales Offices: New York, N. Y.; Chicago, Ill.; Houston, Texas

Producers of: Catalysts, Inorganic Acids, Superphosphates, Triple Superphosphates, Phosphate Rock, Silica Gels and Silicofluorides. Sole Producers of DAVCO® Granulated Fertilizers.

TO MAINTAIN HIGH PRODUCTION

AND REDUCE DOWN-TIME...



ESSO installs 7,956 Anaconda Cupro Nickel, 30%-702 Tubes in condensers and coolers at Bayway Refinery

This condenser is used in the No. 1 Fluid Catalytic Cracking Unit at the Bayway Refinery of Esso Standard Oil Company at Linden, N. J. The unit produces about 25,000 barrels of petroleum products daily—ranging from high octane gasoline to heating oils.

7,956 ¾" Cupro Nickel, 30%-702 Tubes were supplied by Anaconda for the condensers and coolers of this cracking unit. On the shell side, these tubes are subjected to temperatures as high as 550°F at 75 PSI by process streams containing both sulfur and salt compounds. On the tube side, the summer salt water temperature ranges from 80°F at the inlet to 110°F at the outlet.

Information gathered from test runs within the refinery indicates these ANACONDA Cupro Nickel, 30%-702 Tubes have a life expectancy in this service of from 6 to 12 times greater than tubes made of Admiralty Alloy.

ANACONDA Cupro Nickel, 30%-702 Tubes are recommended where process liquids, vapors and cooling waters are corrosive—particularly where temperatures are too high for other copper alloys. Tubes of this alloy also have superior resistance to sea water at high velocities. They have good physical properties at elevated temperatures and resist stress-corrosion cracking.

Our files bulge with a collection of tube performance case histories that can answer many of the corrosion problems you face. We can put the information in these files to work for you at once—to help you select the one best alloy for your job. Write, outlining your operating conditions, to Dept. TD. The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass, Ltd., New Toronto, Ont.

ANACONDA®

Tubes and Plates for Condensers and Heat Exchangers

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Chemicals and Services

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PROVIDE ANSWERS TO MANY OF THE OIL INDUSTRY'S MOST ANNOYING PROBLEMS

The thousands of Tretolite Company product applications to be found wherever oil is produced, transported or refined are your assurances that year after year, in case after case, the Tretolite answers have been effective, economical and satisfactory.

PROBLEM	ANSWER		
EMULSIFICATION	*TRET-O-LITE demulsifiers*	+	S
CORROSION	*KONTOL preventives*	+	E
SALT	*TRET-O-LITE desalting*	+	R
SCALE	*S.P. scale preventives*	+	V
POLLUTION	*TRET-O-LITE clarifiers*	+	I
PARAFFIN	*SOLVO paraffin solvents*	+	C
SLOP OILS	*TRET-O-LITE demulsifiers*	+	E
STRIPPING	*DEHYDRO asphalt additives*	+	
TANK BOTTOMS	*TRET-O-LITE demulsifiers*	+	

Tretolite chemicals and services are available to all divisions of the industry—production, pipeline, refining and transportation. To be sure you have the correct answer to your problem, write or call

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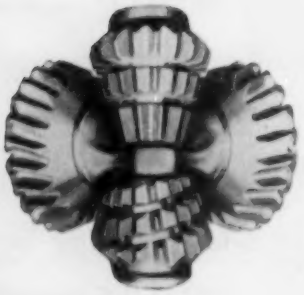
VERTICAL HOLE DRILLING

DRILL A STRAIGHT HOLE FROM THE START OR STRAIGHTEN UP YOUR CROOKED HOLE WITH REED ROCK BITS

REED ROCK BITS



REED ROLLER BIT COMPANY

HOUSTON 1, TEXAS

Gulf Coast, Mid-Continent, Rocky Mountain and Canadian Distributor for Martin-Decker Products

5349

They Say—

Trip to Texas Suggested

Dear Sir:

The November 1st issue of The Oil and Gas Journal (page 43) carried an excerpt from one of your recent editorials which, it seems to me, shows a disturbing—if understandable—lack of knowledge and understanding of the oil industry and its problems . . .

Your references to "The Texas oil crowd . . ." and "The oil millionaires . . ." seem to indicate that you visualize everyone connected with the oil industry bathing in warm, newly produced, high-gravity crude oil each morning. May I hasten to assure you that for each one who has made a million or more from oil or gas production there are thousands of us either making reasonably small salaries working for oil corporations, or struggling to make the first barrel of oil or the first thousand cubic feet of gas on our own individual initiative.

As for the so-called "tidelands" which you mention—they are too big and expensive a proposition for us little operators to have anything to do with, and we know that it will be many a year before even the big corporations which are exploring them now will ever get a dollar of profit out of these operations. Believe me, Sir, we supported the "tidelands" legislation not because we thought we could get rich from it, but because we believe in the sovereign rights of the various states.

. . . I suggest that you send a representative to Texas to learn about our problems and to discuss them with some of the people who face them every day.

Axtell Byles, San Antonio, in a letter addressed to the editor of The Capital Times, Madison, Wis.

State Control Wanted

"Federal Power Commission control of gas production and excessive oil imports are costing Texas its economic health . . .

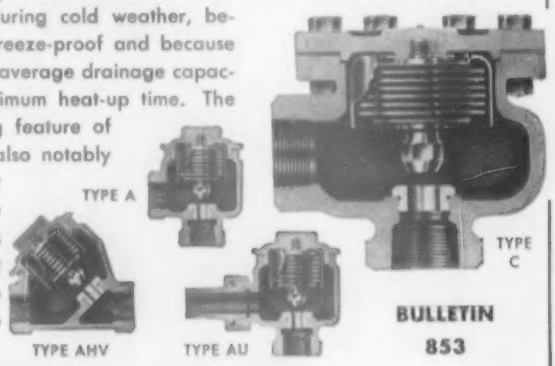
"There is no justification whatever for federal price regulation of gas production and gathering—a function specifically reserved to states by the Congress. Our Texas gas sells in the field for less than a fourth the field cost of competing fuels. Failing to recognize that price adjustments are necessary to a continued gas supply, some northern consumer pressure groups have successfully demanded FPC freeze orders which, if continued, will forever deny

NICHOLSON MAKES

Freeze-Proof Steam Traps

for every Plant Use

Because they drain completely when cold, these four types of Nicholson steam traps are positively freeze-proof. Can be freely installed outdoors. Universally recommended for use in lines which need not be in continuous use during cold weather, because they are freeze-proof and because their 2 to 6 times average drainage capacity results in minimum heat-up time. The non-air-binding feature of Nicholson traps also notably facilitates heat transfer in severe weather. Types for every plant use. Size ¼" to 2"; pressures to 300 lbs.



BULLETIN 853

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W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

OCECO Gauge Hatches and Manheads

Assure gas-tight closure

● Easy opening, tight closing treadle type hatches 4", 6", 8" and 10" sizes in styles for roofs with pitches from zero to 7 inches per foot. Also 4", 6" and 8" treadle type hatches for pipe mounting;—"pressure type" hatches, held closed with a yoke and hand wheel;—and 20" manheads.

Covers are centrally supported permitting closing pressures to be distributed evenly around the entire seating surface, assuring gas-tight leak-proof closure that protects the tank against fire and prevents vapor losses. Write for Data Sheets.

OCECO TANK FITTINGS

THE JOHNSTON & JENNINGS CO.

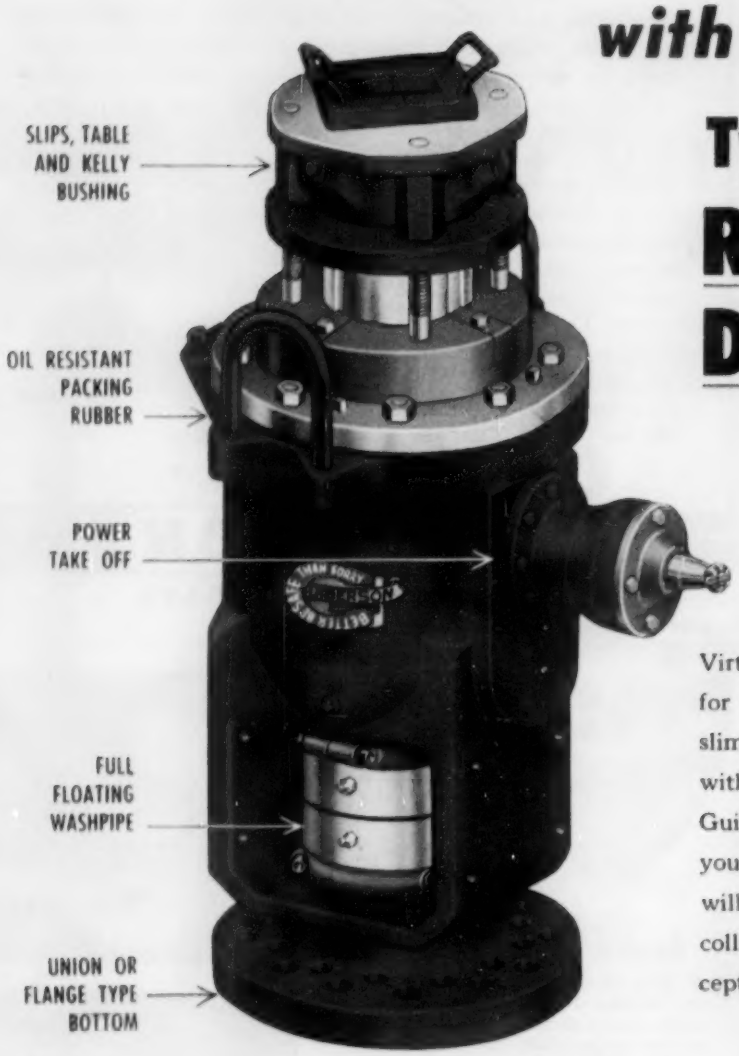
division of PETTIBONE MULLIKEN CORP.

4751 West Division St. • Chicago 51, Illinois

Bring cuttings up FAST... by reverse circulation

with GUIBERSON

Type J ROTATING DRILLING HEAD


SLIPS, TABLE AND KELLY BUSHING
OIL RESISTANT PACKING RUBBER
POWER TAKE OFF
FULL FLOATING WASHPIPE
UNION OR FLANGE TYPE BOTTOM

Virtually a small rotary table, for work-overs, clean-out work, slim-hole drilling, or drilling in with controlled pressure, the Guiberson Type J Head offers you many exclusive features. It will drill cement plugs, float collars and new hole at an exceptionally fast rate.

BOTTOM CONNECTION	CASING SIZE
Union, Minor Hub with Two 2" Side Outlets	5½" 7"
Union, Standard Minor Hub	8⅝"
Flange, 6" — 600 6" — 900 Series	6"-7"

THE
GUIBERSON
CORPORATION

ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.

Sold By Leading Oil Field Supply Stores Everywhere

the Texas economy anything approaching a reasonable return for this valuable resource.

". . . The FPC has bid for support of small producers and royalty owners who are suffering price discrimination in trying to consolidate this power grab. We of TIPRO take the position that such discrimination must be eliminated, but it is the responsibility of states rather than federal bureaus to do so. We believe the most practical way of doing so is through an economic waste statute which would instruct the Texas Railroad Commission to take into account economic waste in the proration of natural-gas production to the end that price discrimination be eliminated and that the well-head price of gas may seek its free competitive level . . ."

Jack Woodward, president, Texas Independent Producers and Royalty Owners Association, in an address before San Antonio independent producers.

Cost of Moving Crude

"It is now possible to move a barrel of crude oil from Edmonton to Vancouver via pipeline for less than the cost of a post card between the same two points . . ."

N. E. Tanner, president, Trans-Canada Pipe Lines, Ltd., in an address in Regina before the Saskatchewan Division of the Canadian Petroleum Association.

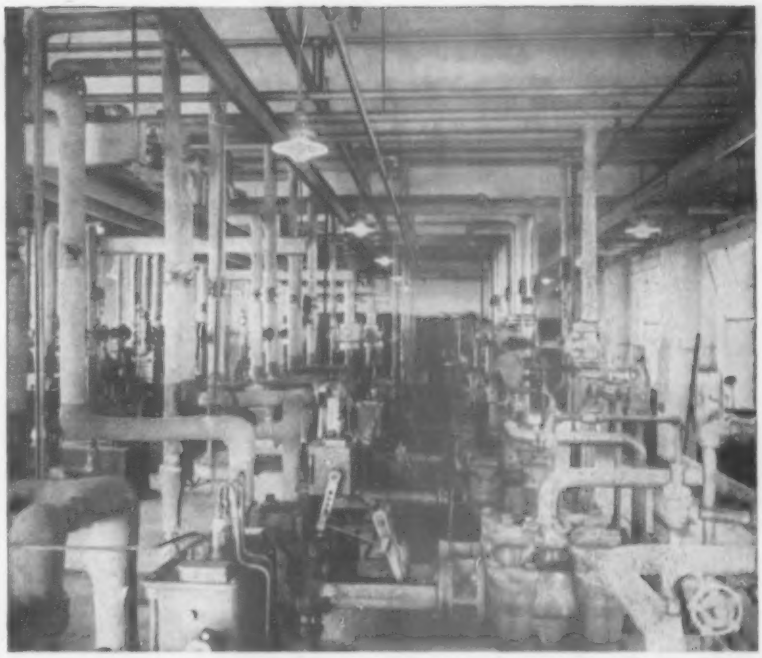
Keeping Gas at Home

"It (the Government) cannot force anyone to hunt for and find gas whose price will be regulated, nor can it compel men to submit for regulation supplies of gas that are not under contract . . .

"Why, from the point of view of a Louisiana or Texas citizen, should local gas be sold in Massachusetts when it could be kept at home for local use? And the question becomes doubly strong when they put it this way: 'The North has plenty of coal. Let it burn coal. Why should we export our gas to it for ridiculously low prices?'

"Under the circumstances, big and little gas producers of seven states are planning to sell their gas, not under contract, at home. This doesn't mean that a vital industry will be slowing down. It means that new customers in nonproducing states who want gas next year may be forced to move to the source of supply. It means that those who are getting gas will not get as much as they want. And it means that thousands of miles of pipelines might ultimately have to carry orange juice or nothing."

David L. Cohn in an article pub-



ENGINEERED PROTECTION

To Lick Fire—Maintain Profits!

Close inspection reveals much more than meets the eye in this petroleum refinery pump room. "Automatic" FIRE-FOG protection, ENGINEERED to this specific risk, is ready at all times to detect and extinguish fire, should it threaten to destroy property, halt production, reduce profits.

This is but one type of a wide variety of fire-fighting systems designed, manufactured and installed by "Automatic" Sprinkler Corp. of America. Others employing AIR FOAM, high or low pressure CO_2, Dry Powder, etc. stand guard over scores of petroleum and petro-chemical properties throughout the world.

The time to plan ENGINEERED "Automatic" FIRE PROTECTION is **before** fire strikes—not **after** fire has destroyed. Contact your nearest "Automatic" Sprinkler fire protection engineer for an appointment with a Safety First future. He'll gladly prepare a fire protection analysis for you without cost or obligation.

"Automatic" Sprinkler
CORPORATION OF AMERICA
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Offices in Principal Cities of North and South America

more than a million!

YARWAY

impulse® steam traps

Starting in 1935, this new idea in steam trapping has earned wide acceptance and approval in practically every industry using steam. More than a million Yarway Impulse Steam Traps have now been sold.

Why? Ask any user. You'll hear reasons like these:

"Quick heating. High, even temperatures"

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"Stainless steel body and working parts"

"Good for all pressures"

"Only one moving part"

"Low cost"

"Immediate delivery from local distributors"

More than 250 Industrial Distributors in the United States and abroad stock and sell Yarways. Write today for the name of the one nearest you.

YARNALL-WARING COMPANY
100 Mermaid Ave., Philadelphia 18, Pa.

® *registered*

Cut-away section of Yarway Impulse Steam Trap showing only moving part, a small stainless steel valve.

lished in Empire Trust Co.'s Empire Trust Letter.

More Steel Per Barrel

"Accelerated drilling activities, deeper wells, and rapid extension of pipelines are among the reasons for a more rapid rise in the shipments of steel to the oil and gas industry than in the output of oil and gas. The total shipments of finished steel products to the oil and gas industry increase 164 per cent from 1945 . . . to 1953, while the production of crude petroleum in this country rose 37.5 per cent and marketed natural gas rose 123 per cent.

"This substantially higher percentage gain in consumption of steel than in the output of oil and gas indicates that increasing quantities of steel are required for the production, processing, and pipeline transportations per barrel or cubic foot of these two fuels. The shipments of steel to the oil and gas industries during 1953 were a record 5,455,000 net tons, compared with 2,063,000 tons in 1945 . . ."

From the December issue of Steel Facts, monthly publication of American Iron and Steel Institute.

CALENDAR OF EVENTS

DECEMBER

30 Industrial Science Secton, American Association for Advancement of Science, annual all-day meeting, Hotel Claremont, Berkeley, Calif.

1955

JANUARY

10-14 Society of Automotive Engineers, golden anniversary annual meeting, Sheraton-Cadillac and Statler hotels, Detroit.

17-18 Kansas Oil Men's Association, annual convention, Baker Hotel, Hutchinson, Kans.

17-19 Pipe Line Contractors Association, annual convention, Hotel Statler, Los Angeles.

26-28 Symposium on instrumentation for process industries, A. & M. College of Texas, College Station, Tex.

27-28 American Chemical Society, symposium on hydrocarbon chemistry, Rice Hotel, Houston.

27-28 Southern California Meter Association, fourth annual instrument short course, Los Angeles Harbor Junior College, Wilmington, Calif.

31-Feb. 2 Sixth annual Southeastern Symposium on Industrial Instrumentation, University of Florida campus, Gainesville, Fla.

FEBRUARY

10-12 Seventh Southwestern IRE Conference and Electronics Show, Baker Hotel, Dallas.

TO THE PEOPLE OF THE

CHEMICAL-PETROLEUM INDUSTRY

Seasons Greetings and best wishes throughout the coming year

CHEMICAL-PETROLEUM DIVISION

NATIONAL AIROIL BURNER CO., INC.

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2200-5000 Volts

Enclosing covers on Overload Relays screwed on . . . give quick access.

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OUTSTANDING ADVANTAGES

1. Reduced floor space
2. Low-cost Div. 2 design
3. 50,000 KVA interrupting capacity
4. Combination starter with Disconnect Switches
5. Corrosion resistant, weatherproof construction
6. Copper tungsten contacts for positive operation
7. Simple 3-wire TIME-DELAY UVP push button circuit
8. THERMAL-MAGNETIC Overload Relays give accurate motor protection . . . trip instantly on faults
9. All internal wiring complete

1914

Petroleum engineers specify these starters for Division 2 semi-hazardous locations because they assure substantial savings in installation and operation.

Construction advantages include: drip-proof roof . . . tank-cover and front cubicle doors . . . oil switch which opens 220-volt control transformer before upper door can be opened to operate main line disconnects . . . hermetically sealed control circuit contacts . . . main contactor with alloy contacts oil-immersed in rear tank. On voltage dips, push button circuit maintained up to 2 seconds by simple 3-wire circuit, permits opening of "stop" circuit without delay.

EC&M 2200-5000 volt Starters are also available in Division 1 style for Class 1, Group D Hazardous Locations. For interrupting capacities above 50,000 KVA, EC&M VALIMITOR (volt-ampere-limitor) Starters are furnished in both Division 1 and Division 2 construction.

Write for 16-page Booklet 1062 for complete details.

THE ELECTRIC CONTROLLER & MFG. COMPANY

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13-17 American Institute of Mining and Metallurgical Engineers, annual meeting, Conrad Hilton Hotel, Chicago.
13-18 A.S.T.M. Committee D-2 on Petroleum Products and Lubricants, Rice Hotel, Houston.
14-16 Rocky Mountain section of A.A.P.G., annual regional convention, Billings, Mont.
16-18 National Association of Corrosion Engineers, sixth annual short course for pipeliners, Mayo Hotel, Tulsa.
23-24 Pacific Coast Gas Association, seminar on electronic data processing, Los Angeles.
25 National Gasoline Association of America, Permian basin regional meeting, Scharbauer Hotel, Midland, Tex.

MARCH

1-2 American Gas Association committee on natural gas reserves, Baker Hotel, Dallas.
4 Southern Gas Association, transmission management conference, Shamrock Hotel, Houston.
7-11 National Association of Corrosion Engineers, Palmer House, Chicago.
9-11 American Petroleum Institute, Division of Production, Southwestern spring meeting, Jung Hotel, New Orleans.
17-18 Southern Gas Association, Distribution Management Conference, Jung Hotel, New Orleans.
20-23 American Institute of Chemical Engineers, Kentucky Hotel, Louisville.
23-24 Pacific Coast Gas Association, accident prevention conference, Santa Barbara, Calif.
23-25 American Petroleum Institute, Division of Production, Mid-Continent District, Herring Hotel, Amarillo, Tex.
27-29 Texas Independent Producers and Royalty Owners Association, ninth annual meeting, Hotel Texas, Fort Worth.
28-31 American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Exploration Paleontologists and Mineralogists, annual meeting, Hotel Statler, New York.
28
April 1 American Society for Metals, 9th western exposition and congress, Pan American Auditorium, Los Angeles.

APRIL

5-7 Corrosion control short course, sponsored by University of Oklahoma and Central Oklahoma Section of National Association of Corrosion Engineers, University of Oklahoma Extension Study Center, Norman, Okla.
7-8 Rocky Mountain District, American Petroleum Institute, Division of Production, Gladstone Hotel, Casper, Wyo.
13-15 Natural Gasoline Association of America, annual convention, Baker and Adolphus hotels, Dallas.
13-15 American Society of Lubrication Engineers, tenth annual meeting, Hotel Sherman, Chicago.
13-15 National Petroleum Association, 52nd semiannual meeting, Cleveland Hotel, Cleveland.
18-20 American Society of Mechanical Engineers, spring meeting, Lord Baltimore Hotel, Baltimore.
19-20 Pacific Coast Gas Association, distribution conference, Phoenix.
19-21 Southwestern Gas Measurement Short Course, North Campus, University of Oklahoma, Norman, Okla.
20-22 Petroleum Industry Electrical Asso-

ciation, annual conference, Shamrock Hotel, Houston.

25-26 Independent Petroleum Association of America, midyear meeting, San Antonio.

28-29 American Petroleum Institute, Division of Production, spring meeting of Pacific Coast district, Statler Hotel, Los Angeles.

MAY

1-4 Liquefied Petroleum Gas Association, annual convention, Conrad Hilton Hotel, Chicago.

1-4 American Institute of Chemical Engineers, Shamrock Hotel, Houston.

9-10 American Gas Association, Gas Supply, Transmission and Storage Conference, Hotel William Penn, Pittsburgh.

9-12 American Petroleum Institute, Division of Refining, midyear meeting Jefferson Hotel, St. Louis.

11-12 Pacific Coast Gas Association, gas supply and transmission and conference of technical session, Palm Springs, Calif.

11-13 American Petroleum Institute, Division of Production, Eastern District spring meeting, William Penn Hotel, Pittsburgh.

12-19 Sixth Latin American Congress of Chemistry, Caracas, Venezuela.

14-22 World Wide Chemical Plant and Equipment Exposition and Congress, Frankfurt Germany.

16-18 American Petroleum Institute, Division of Transportation, products pipeline conference, Edgewater Beach Hotel, Chicago.

16-18 Southern Gas Association, New Orleans.

23-25 American Petroleum Institute, Division of Marketing, midyear meeting, Chase and Park Plaza hotels, St. Louis.

26-27 Kentucky Oil and Gas Association, annual meeting, Lafayette Hotel, Lexington.

30-June 1 Chemical Institute of Canada, thirty-eighth annual conference and exhibition, Quebec City, Que.

JUNE

5-9 Canadian Gas Association, annual meeting, Sheraton-Brock Hotel, Niagara Falls, Ont.

6-10 American Petroleum Institute, Division of Production, midyear committee conference, Brown Palace Hotel, Denver.

6-15 Fourth World Petroleum Congress, Rome, Italy.

9-10 Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ont.

9-10 Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh.

11-15 Petroleum Equipment Suppliers Association, annual meeting, Banff Springs Hotel, Banff, Alberta, Canada.

12-17 Society of Automotive Engineers, golden anniversary summer meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

16-18 Interstate Oil Compact Commission Denver

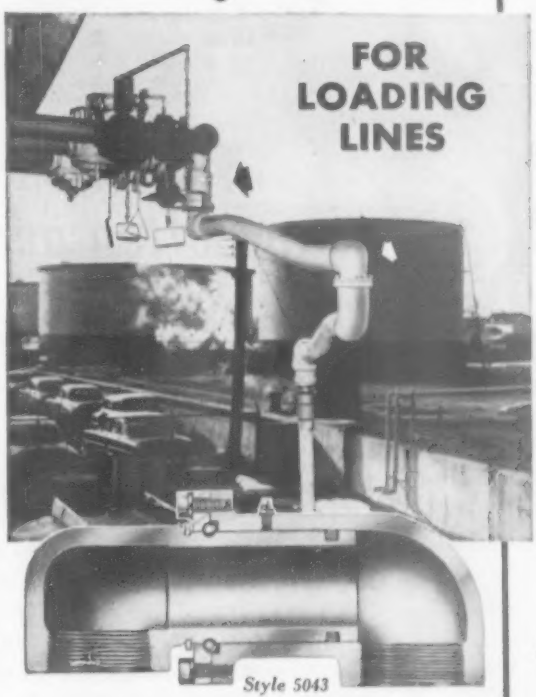
20-23 American Society of Mechanical Engineers, semiannual meeting, Statler Hotel, Boston.

26-July 1 American Society for Testing Materials, Chalfonte-Hadden Hall, Atlantic City, N. J.

AUGUST

15-17 Society of Automotive Engineers, golden anniversary West Coast meeting, Hotel Multnomah, Portland, Ore.

BARCO Swing Joints



Style 5043

HERE is why users like BARCO'S new *all-steel* Swing Joints for loading and unloading gasoline, oil, lube oil, LP gas, petro-chemicals and other fluids:

BALL BEARING AND O-RING EQUIPPED—In Barco Swing Joints, the ball bearings do not fall out when joints are taken apart! Long bearing provides adequate pipe support. *Special O-ring seal eliminates frequent gasket replacement.* Seals on pressure or vacuum. Leakproof service over wide temperature range, −40°F. to 225°F.

LONG LIFE—New *"Bar-Moly"* dry lubricant process gives a permanent anti-galling, corrosive-resistant finish to moving parts. This, combined with routine lubrication, insures longest possible maintenance-free service.

EASY MAINTENANCE—Joints can be disassembled for inspection without disconnecting piping. O-rings are easily renewable in the field. Frequent greasing not required to maintain sealing.

MANY STYLES—The Barco line is complete with single swing, double swing, and counter-balance styles to meet every need. Sizes 2", 2½", 3", 4".

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Worldwide Sales and Service

For complete information on Barco Swing Joints, ask for a copy of Catalog 400.

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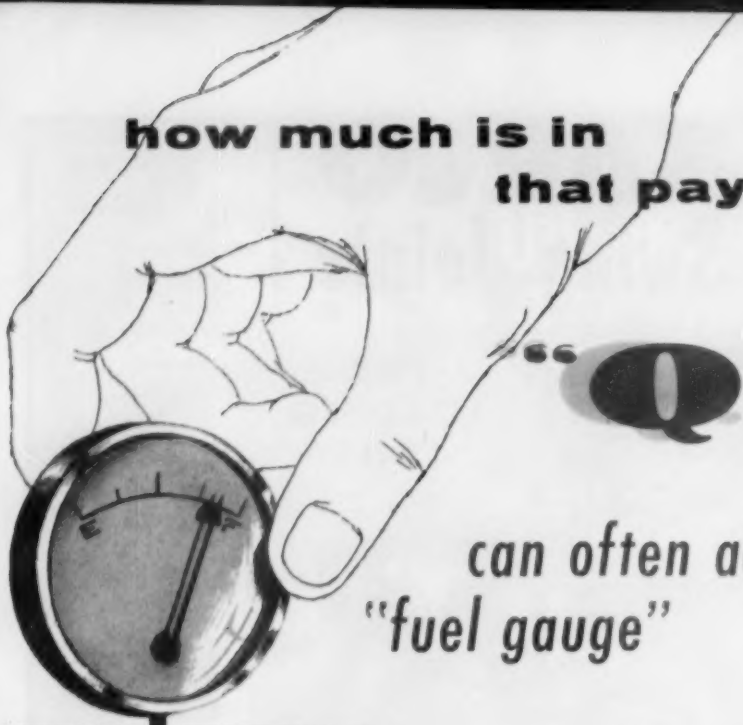
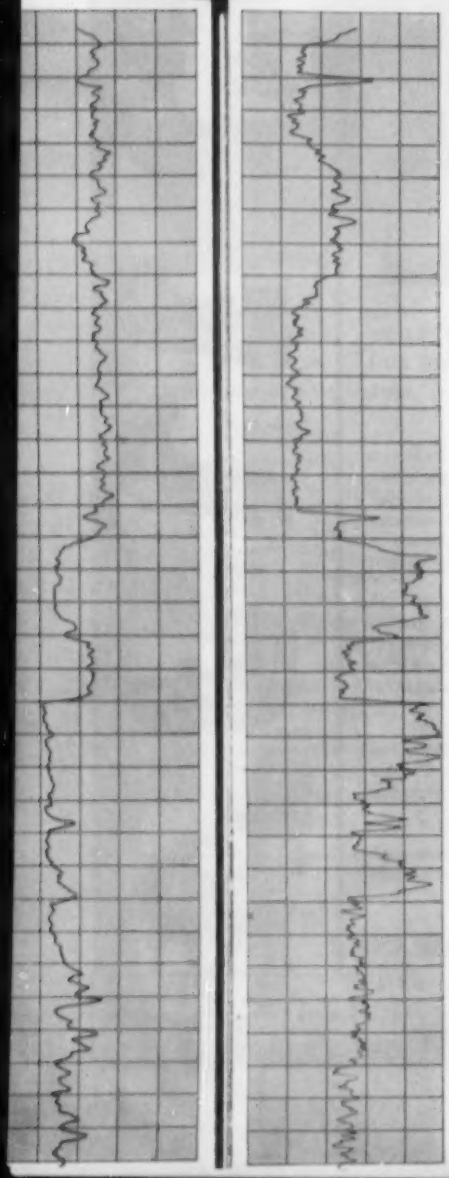


"Q.I."

can often add the "fuel gauge"



"Q.I." stands for *Lane-Wells Quantitative Interpretation of Radioactivity Well Logs* – the service which adds for you the all-important information "How Much." For over three years now, operators in Texas, Kansas, Oklahoma and other states have found Q.I.'s estimates of reservoir potential sufficiently accurate for all commercial purposes. New and improved techniques, together with the steadily increasing amount of down-hole data, are rapidly extending Quantitative Interpretation to more and more fields whose formation responses permit reliable evaluation. Your Lane-Wells man can tell you all about this important service—check with him now.

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THE OIL AND GAS
JOURNAL

TULSA, OKLAHOMA

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JOURNALLY Speaking

Globe Trotting

HEREWITH this department brings you its annual international review. It competes (but not very much) with the Big Yellow Book's somewhat more comprehensive international roundup farther along in this issue.

Dahl Duff, the Journal's International Editor, worked a whole year on his material. We got ours in less than an hour simply by reading between the lines of the Duff stuff. Nice work if you can get it.

As is customary, we'll start off with a profound, all-inclusive observation: The international picture is mixed but has definitely encouraging aspects.

Oil was discovered in quite a few places around the globe, causing the local yokels to dream of immediate wealth and prosperity. Also quite a few dry holes were drilled, dashing hopes to the nadir of despair. Foreigners are easily discouraged by dry holes, especially (and with good reason) when governments are doing the wildcatting.

Australian hopes leaped like a kangaroo with first pay show, then died like a williwaw when offsets hit the suitcase sand. Our forecast: More of both successes and dry holes if enough drilling is done.

Cuba brought in a well that had half the oil men of this country doing the mambo (but we just stood around). Then some dusters made them all look like zombies. One little-publicized reason why American oil men want Cuban production is a law guaranteeing the island's market to local production; hence no competition from imports. Our forecast for Cuba: See above under "Australia."

Oil development raises the standard of living wherever it occurs. Bahrain is an island in the Persian Gulf that used to be famous for pearls and piracy. Then American oil men discovered that it is the top of an anticline. Now Bahrain has many modern improvements, including a paved highway clear around it on which the local sheik can drive his high-powered foreign motor cars 'round and 'round.

Kuwait is a blob of burning sand nobody ever heard of until recently. Now it's Texas' biggest pain in the neck. It beats Texas in two respects: It has more oil and less water. In fact, it has no water at all. Its inhabitants used to import a goat skin full of water now and then just to get a taste of how the rest of the world lived. Now that they are exporting oil they are desalting sea water, putting up drinking fountains all over, and erecting air-conditioned buildings over them.

Kuwait has it over Texas in another respect, too. It doesn't have to worry about imports of oil.

The Neutral Zone is still neutral. Its government is equally divided between two countries. Its wells are equally divided between dry holes and producers. Its oil is equally divided between two operators. And the American companies owning the oil are equally divided on whether or not to import it.

Qatar is pronounced "gutter" by most oil men. And some who have been in that God-forsaken precinct call it worse than that. But Qatar had a "tidelands" oil fight almost as good as ours. American customs spread around the globe.

France tried to find oil by means of government-controlled operations but had no luck for years and years. Then it let down the bars to private enterprise and an American operator promptly found the biggest field on the continent. Proves that fifty million Frenchmen can be wrong.

Europe now has its first oil pipelines worthy of the name. Can you imagine a whole continent without pipelines? No wonder those European cars are so tiny.

Diplomats could get a lesson in international gratitude from the story of why Gulf has only half of Kuwait's oil. But that's Dahl Duff's story, and you can read it in his part of the book.

As a matter of fact, you probably can get quite a bit more information about global oil operations out of the Journal's international section than you can on this page. We recommend it.

Henry D. Ralph.

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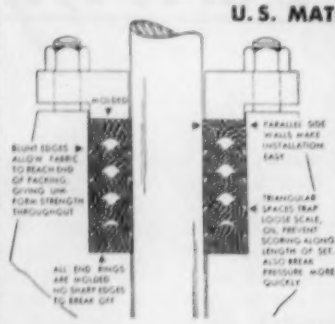

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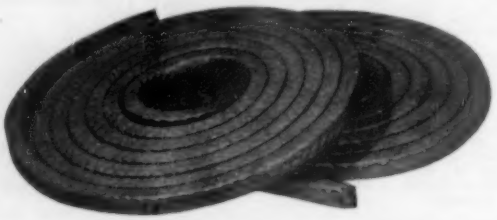

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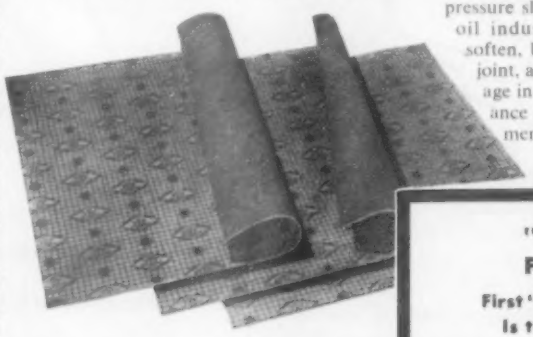

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Centrifugal	193	193	413	16193	193	512	193	Weak 136 Strong 293	293
Reciprocating Steam End	101	101	101	101	101	101	101	101	101
Fluid End	16010	16010	16012 251	16012 251 16133	16022 251	16022 512	133	16022 251	293
On Piston	463	453	575	575	...	...	...	...	...
Valve Stem	125	125	413	16193 16133	125	512	125	125	293
Gaskets	9	9	899	899	899	899	9	9	19069 899

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Markets can be built for the world's oil surplus

A GREAT deal of oil was discovered in various parts of the globe during 1954. Many older producing areas enlarged their reserves significantly, and discoveries were made in such widely separated and entirely new areas as Australia, Cuba, France, and Germany.

This oil was found under conditions of free competition. The essentials of this—far more basic and important than the form of corporate organization or degree of government participation—are the competitive judgment of independent experts and freedom to make individual decisions and to risk money on them.

PRIVATE ENTERPRISE CAN'T ALWAYS find oil, as witnessed by recent failures in Peru, Ecuador, Colombia, and elsewhere. But the more competitive judgment and free investing are employed, the greater are the chances of finding it. A number of countries—Turkey, Egypt, Argentina, Brazil, Bolivia, Chile—seem to be coming to this conclusion.

There is little danger that the world will run short of oil in the near future. In fact, the world as a whole has too much oil at the moment. Reserves, producing capacity, refining facilities, tanker fleet—all are greater than needed to supply current rates of consumption.

The problem of the next couple of years is to handle this excess capacity in an orderly and equitable fashion. The builders of oil reserves have done their job just a bit too well. Unfortunately, some of them must temporarily refrain from full utilization of what they have built.

BUT THE SAME KIND OF INITIATIVE, imagination, and patience that found the oil can now find what to do with it. Building new markets—not just taking old ones away from other suppliers—should now be the prime concern of producers and refiners with excess capacity. Areas which traditionally have placed obstacles in the way of heavy consumption of petroleum products should be induced to encourage greater use of oil in all its forms.

Western Europe is a case in point. Its increase in economic activity and standard of living during the last couple of years has been phenomenal, and so has its increase in per capita consumption of oil. Continued economic progress coupled with specific measures to stimulate consumption would soon put to work Europe's presently excess refining capacity and much of the Eastern Hemisphere's crude capacity.

World events of the past year have demonstrated that competition and enterprise can develop new oil supplies. Properly applied, the same force can develop new markets for this oil—and boost economic activity and the standard of living all around in the process.

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Fast combination treatment by DOWELL increased well potential and boosted allowable

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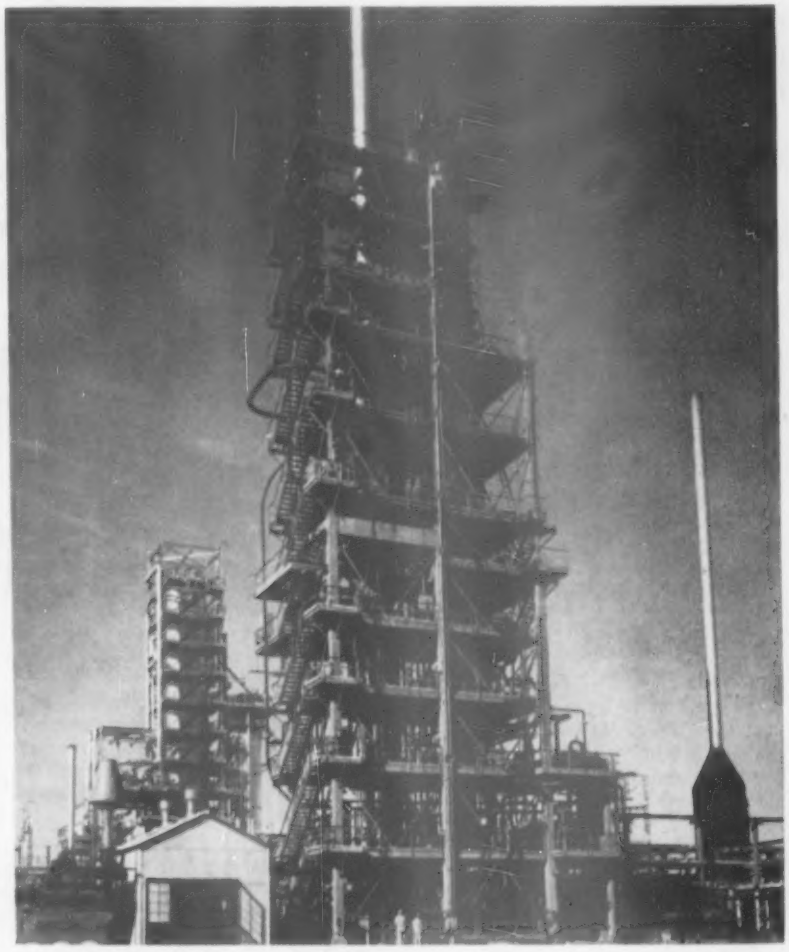
THIS WEEK . . . . . IN THE NEWS

CONGRESS—The natural-gas industry looks to the new Congress next week for answers to questions that are vital to the industry. . . . The new session will certainly receive legislation to amend the Natural Gas Act to exempt producers and gatherers of gas from FPC authority. . . . The big question is whether the concerted drive of the industry for this legislation will meet opposition stiff enough to stymie the effort. . . . President Eisenhower's policy of less government interference in business is well established, but the industry would like to know for certain if his administration will back gas legislation and if he will sign such a bill if Congress passes it. . . .

PRODUCTION — Stripper wells now account for 7 out of every 10 producing oil wells in this country and deserve the label "backbone" of the oil industry. . . . Recently completed tabulation of strippers by the Interstate Oil Compact Commission reveals wells in this category number 332,552 and average 3.14 bbl. per well daily. . . . ¶Texas Railroad Commission boosts the state's January allowable by a whopping 278,484 bbl. daily. . . . The boost is accomplished by increasing the producing-day schedule to 18 days, compared with December's 16. . . . It is one of biggest jumps ever in Texas allowable.

EXPLORATION—Hunt Oil will start drilling soon on another deep wildcat in southern West Texas. . . . Location of a 18,000-ft. test has been staked 20 miles south of Fort Stockton. . . . ¶Forest Oil is looking for deeper production in northeast Pecos County. . . . Three 6,500-ft. tests are planned in a 40,000-acre block. . . . ¶Hudson's Bay well in West Pembina indicates extension of Cardium production. . . . ¶Texaco makes its first strike in Pembina area with a test about 42 miles southeast of Pembina field. . . .



THE WORLD'S FIRST commercial fluid-coking unit is being tested at Carter Oil Co.'s Billings, Mont., refinery. The first reduced crude was charged in the unit Christmas night. The unit was heated up the previous week and seed coke was later admitted. The coker is designed to process 3,800 bbl. daily of heavy residual feed stock, and will produce about 180 tons of fluid coke per day. It is one of three cokers planned in the United States.

INDUSTRY—Rubber Facilities Disposal Commission is expected to meet the deadline for contracting for the sale of the government-owned synthetic rubber facilities. . . . Oil companies that have been operating the plants for the Government are leading the parade of buyers. . . . ¶Kirby Petroleum Co. will be liquidated following the approval by stockholders of the sale of the company's properties to Continental Oil. . . .

PIPELINES—Newly formed Coastal Transmission Corp. reveals plans for a 400-mile, 30-in. gas pipeline from Beaumont area to near McAllen. . . . Officials of the company, a Clint Murchison enterprise, decline to reveal source of gas supply, but persistent reports of Murchison negotiations with Pemex for Mexican gas lend credence to belief Mexican gas may cross border. . . . Western terminal of the line would be only a few miles from U. S.-Mexico border and nearby Mexican gas fields. . . . ¶Westcoast Transmission plans to start building its line from Peace River to the U. S.-Canadian border by September 1955. . . . Company reveals plans in request for extension of export permit granted by Alberta government. . . .

NATURAL GAS—The FPC's long awaited modification of Order 174-A comes, but it leaves gas producers almost as much in the dark as before. . . . New order disposes of many escalation clauses by outlawing them effective next May 1. . . . Commission will no longer consider third party, favored nation escalation clauses in granting rates. . . . ¶Transcontinental Gas makes deal with Dome Gas & Oil for joint exploration in Ulster County, New York. . . . ¶Ohio Oil Co.'s gas-gathering system connection with United Gas line in southern Mississippi opens another large part of Maxie-Pistol Ridge gas-condensate area to production. . . .

Natural gas looks to . . . Congress For Some Answers

Bertram F. Linz

WASHINGTON. — The answers to some vital natural-gas industry questions should become apparent in the next few months. They're important questions and the answers could decide the entire future of the industry.

They include:

. . . What will be the attitude of the Democratic-controlled Eighty-fourth Congress on legislation to exempt independent producers from Federal Power Commission regulation?

. . . What are chances for amending the Natural Gas Act?

. . . Will President Eisenhower sign on the dotted line if Congress does amend the act?

Because the Federal Power Commission, perhaps reluctantly, is rapidly reaching the point where it will begin to regulate gas producers' rates in a big way, every effort will be made to speed the legislation designed to override the Supreme Court decision in the Phillips Petroleum Co. case.

Promptly with the convening of the new Congress next week, bills will be introduced to spell out what the industry believes the Seventy-fifth Congress meant when it wrote Section 1 of the Natural Gas Act in 1938. Until the Supreme Court ruled otherwise last June 7, it was assumed independent producers and gatherers, selling gas to interstate pipelines in "arms-length" transactions, were not to be subject to any federal regulation.

The support . . . The legislation will have powerful support from administration and congressional leaders.

Neither the FPC, whose members have disclaimed any desire to take on the herculean task of regulating the producers, nor any other interested government agency is expected to oppose it.

The oil task force of the President's Cabinet Committee on Energy Supplies and Resources Policy is understood to have recommended it.

The President has consistently followed a policy of minimizing federal interference with industry. He has demonstrated it in signing bills restoring tidelands to the states and exempting from FPC regulation gas distributors operating entirely within a single state. The President recognizes the chaotic situation in the gas industry. It is hoped he will recommend legislation in one of his messages to Congress. At the least he is expected to give tacit support.

In Congress, leaders of both parties have gone on record as favoring the exemption of producers from regulation.

The Democratic leadership—Lyndon B. Johnson of Texas in the Senate and Speaker-to-be Sam Rayburn of Texas in the House—are expected to lead the drive. Rep. Joseph W. Martin, Jr., of Massachusetts, then minority leader in the House, voted for similar legislation in 1950. Sen. William H. Knowland of California, who was majority leader last year, voted against the 1950 bill, but if elected minority leader next session may go along with the administration's policy.

The delegations from the major producing states—Texas, Oklahoma, Louisiana and Kansas—are united firmly behind the legislation. But every state in the Union except Vermont now has or soon will have natural-gas service. Delegations from the consuming states will have to give the gas industry the support needed to pass a measure.

With the shift in political control, and many new members in the House, it will be some time before the lineup of Congress becomes apparent. But, the fight over the legislation will come into the open when public hearings open before the House or Senate interstate commerce committees.

Spokesmen from the industry will talk at those hearings for thousands of producers. Representatives of the state public service commissions will claim to speak for hundreds of thousands of consumers.

The oil and gas industry will make a determined fight. It will have the support of the coal industry, for reasons of its own. But the public service commissions of the consuming states and "liberal" newspapers, columnists and radio commentators will take a stand as champions of the people.

The situation in which the industry finds itself is due in part to procrasti-

nation by Congress. The question of the producers' situation is almost as old as the Natural Gas Act itself. It is a question on which a majority of the FPC has been first on one side, then on the other, but never unanimously.

How it happened . . . Amendment of the law has been talked in Congress for a decade or more, long before the natural-gas industry began its great postwar expansion and when legislation could have been passed without raising any great public outcry. The FPC has opposed changes in the act, assuring congressional committees it did not intend to undertake any general regulation of producers.

But the issue refused to die. In August 1947 the FPC issued its famous Order 139 which accepted the thesis it was the intent of Congress that the control of production or gathering of natural gas should remain a function of the states. It announced it would not assert jurisdiction over independent producers and gatherers who might be subject to regulation solely because of arms-length sales.

Little more than a year later, in October 1948, the commission ordered an investigation of the Phillips Petroleum Co., starting a chain of events that led eventually to the Supreme Court.

Truman veto . . . Finally aroused to the potentialities of the situation, Congress got down to work and in 1950 the industry came within the stroke of a pen of getting the legislation it had fought for. But the pen was in the hand of former President Harry S. Truman and he used it, not on the bill sent him by Congress, but on a veto message.

Using the same arguments as did the commission in opposing the legislation, Truman said "there is clear possibility that competition will not be effective, at least in some cases, in holding prices to reasonable levels" if the producers were specifically exempted from regulation.

On the basis of the veto measure, the commission rescinded Order No. 139 in July 1950, but still maintained it had no intention of inaugurating a general investigation respecting producers' rates. The FPC said it would confine its adjudications to the sales of individual producers or gatherers which had a material effect on interstate commerce, where rates appeared to be excessive.

A year later the commission dismissed the Phillips case, holding the company was not a producer within the meaning of the act. The State of Wisconsin, the Wisconsin Public Service Commission and the cities of Detroit, Kansas City, and Milwaukee challenged the decision in the courts. Last June, the Supreme Court held the Phillips Petroleum Co. is a natural-gas producer under the act, and 4,000 natural-gas producers were blanketed under the FPC.

The industry story . . . When the question of defining the producers' status comes before the congressional committees, the industry will argue that federal regulation will impose an effective damper on the incentive to explore and develop new gas resources, influence producers to keep supplies locked in the ground, and slow down the expansion of gas service to areas which are asking for it.

They will tell the committees that amendment of Section 1 will not only clarify the situation and free the producers for vigorous exploration for new reserves, but will release trillions of cubic feet of gas now locked up. The action will make for increased competition to sell, which will insure reasonable rates.

The main point of the opposition will be the protection of the consumer against high prices and the possibilities of monopoly. The issues that were raised in 1950 will be fought over again.

50-50 Chance . . . Members of the industry who have followed the fight from its inception and members of Congress who will play an active part in the new effort, give the legislation little better than a 50-50 chance of getting through Congress this session.

The 1950 measure was passed in the Senate by six votes—44 to 38—but had only a two-vote margin in the House, where it was approved 176 to 174. Bearing in mind that more areas now have natural-gas service than in 1950, that many candidates in the last election raised the "give-away" charge against the administration, and that the 1956 presidential campaign already is unofficially under way, it would be difficult to say the industry has gained substantial support in Congress.

The issue, however, is one that cuts across party lines. The 1950 bill was passed by a Democratic Congress but 16 of the senators and 76 of the congressmen who voted for it were Republicans. The line will not be political, but geographical.

Consumers must be sold . . . Here is how industry observers and supporting members of Congress see the situation:

The big job is to sell a lot of people from the consuming states an idea—that the Supreme Court decision doesn't necessarily work to their advantage.

As it stands now, Congress might be able to pass a bill to amend the act but proponents of the legislation would feel a lot better if they thought they had a few more votes.

There appears to be no organized bloc of opposition building, but no cross-section of the new Congress has yet been possible. The delegations from Wisconsin and the adjacent area that fought the Phillips case through the courts are expected to stand firmly against amendment of the law, but it is not yet known whether they will make a crusade of their opposition.

Some congressmen fear the effect of the barrage of criticism to which the industry has been subjected in newspaper columns and over the air during the past few years. Public opinion in some areas is that anyone even remotely connected with oil or gas has money running out of his ears and is greedy for more.

The oil and gas industry has made a great effort to counteract this propaganda and feels that much has been accomplished toward giving the country a true idea of how it is supplied with ever-increasing volumes of oil and gas. The real effect of that effort will be told in the votes on the legislation.

It's Your Front Cover Now . . .

THE JOURNAL takes another forward stride with its first issue of 1955. It will have a new cover.

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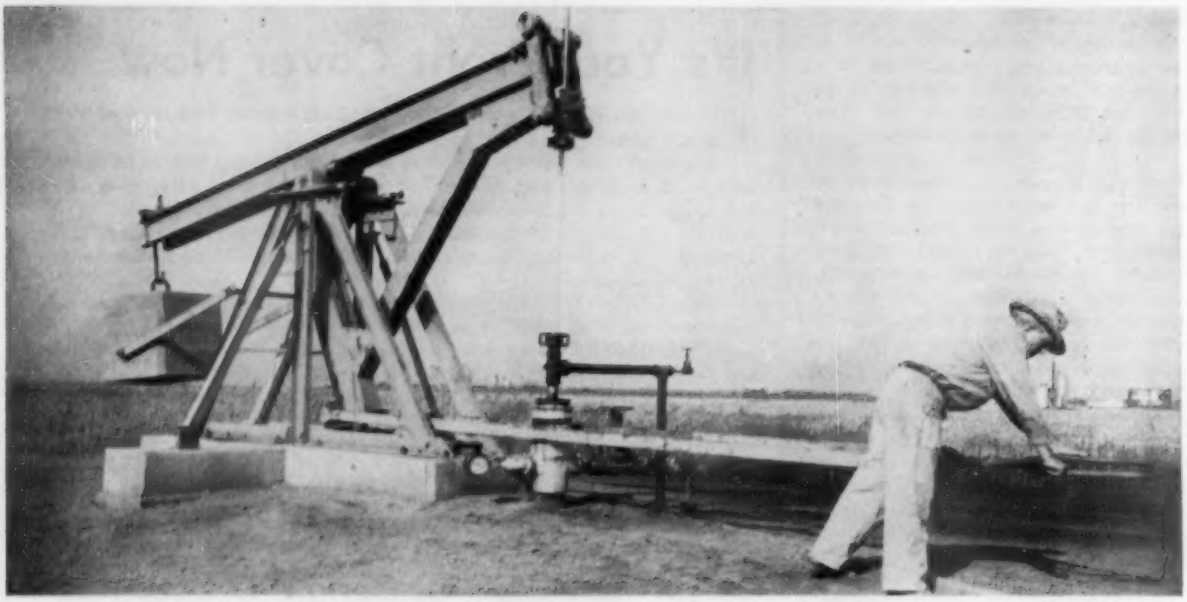


Strippers are the "old men," but . . .

They're the Oil Industry's Backbone

Kenneth B. Barnes

TULSA.—Stripper wells have been called both "the old men" and "the backbone" of the petroleum industry, and with good reason.

These wells are well along in their producing life. However, their slow production is steady. Their "decline curve" rates are very low, often only 3, 2, or even 1 per cent per year.

A count of the U. S. strippers recently completed by the Interstate Oil Compact Commission shows a total of 332,552. This means that 7 out of every 10 oil wells in the country are now in the stripper category. It also points out expressively the high cost of producing some of this country's oil. A stripper oil well by definition is one that is in a marginal, limited, and narrow profit margin. In fact, a stripper well is one that barely gets by. Actually, over a thousand strippers are plugged and abandoned each month. The study shows 13,278 abandonments for 1953.

Many stripper wells operate intermittently in the red ink column, are continued on production only because of hope for higher crude prices, are held for future application of secondary-recovery techniques, or to retain the lease for deeper drilling.

This year's I.O.C.C.-National Stripper Well Association studies show the 332,552 wells averaged 3.14 bbl. per well per day.

Since the strippers are the wells making very little profit, and often none, the general relationship of increased producing expense with increased depth shows up clearly in the tabulation of data for the individual states. New York and Pennsylvania are among the nation's most shallow producing areas. There the wells average 0.339 and 0.392 bbl. per well per day. Somewhat deeper, West Virginia and Ohio are averaging 0.634 and 0.659. For the deepest, Colorado and California average 10.27 and 10.21.

STATES, OVER 50 PER CENT STRIPPER PRODUCTION

	Per cent stripper of tot. prod.
Illinois	91.0
Indiana	92.6
Michigan	81.8
Missouri	100.0
New York	100.0
Ohio	100.0
Pennsylvania	100.0
Tennessee	100.0
West Virginia	100.0

STATES, LESS THAN 50 PER CENT STRIPPER PRODUCTION

	Per cent stripper of tot. prod.
Arkansas	24.6
California	15.5
Colorado	1.5
Kansas	26.3
Kentucky	34.5
Louisiana	3.8
Mississippi	1.5
Montana	44.0
Nebraska	3.5
New Mexico	8.1
Oklahoma	33.5
Texas	8.8
Wyoming	6.5
TOTAL U. S.	**16.1**

Many stripper wells "pump off" in 20 or 30 minutes time each day. There are probably 200,000 of them in this category, and they are a familiar site in practically every oil-producing state—mostly coupled in groups of 5, 10, or 15, by ribbon-like rod lines, to central powers. Much of this production is in the hands of small independent operators.

Not all strippers pump off in 30 minutes or lift only a third of a barrel of oil. Many strippers run 24 hours per day, are equipped with big 40-hp. individual pumping units, and lift 400 to 800 bbl. of salt water per day to produce 5 to 10 bbl. of crude. These are the "heavy water wells" in the stripper category.

Costs . . . The principal cost elements for stripper production are pumpers' salaries, supplies, transportation, and well reconditioning. The list is a long one (see table) even before one gets into detailing the hundreds of items that can enter into the one heading "Supplies." In the economics of stripper production, two of the most important items are the operations themselves, and well reconditioning.

A good stripper well operator is a real production expert. He knows which type of sucker-rod pump best suits his particular producing area. He doesn't pump off the well too quickly. The stroke is timed slowly so that the mini-

mum operating fluid level will prevail—this gives maximum production. The good stripper-well operator knows all the ins and outs of equipment maintenance and repair, and good lease housekeeping.

On well reconditioning, the operator maintains accurate test production records for each individual well. Each time a well is pulled, measurements are made of "feet off bottom." Wells that gradually sand up or cave in are bailed, or tools moved in for cleaning out.

There probably are no more economical oil operators anywhere than those who had to carry stripper oil production through the depression years of the early 1930's, with oil priced at 60 cents per barrel.

Reserves . . . Five states have primary stripper well reserves exceeding one quarter billion barrels each—California, Kansas, New Mexico, Oklahoma, and Texas. These same states also have even more stripper reserves possible by secondary-recovery application. Total U. S. primary stripper reserves are 3,983,326,000 bbl. and the secondary stripper reserves are 3,286,855,000 bbl. This is a grand total for the strippers of 7,270,181,000 bbl. The comparable U. S. primary crude oil reserves for the same time was 29,643,000,000 bbl. *(The Oil and Gas Journal, January 25, 1954, p. 137).*

Joint stripper well committee . . . This is a coordinated effort of the I.O.C.C., the National Stripper Well Association, and Independent Petroleum Association of America.

The committee states: "Definition of a stripper well continues to be a perplexing problem inasmuch as no specific and definite rule can be made which will apply to each and all areas. In general these wells are those which, producing at their maximum unrestricted capacity, produce oil in such a volume that the profit from their operation is insufficient to warrant additional development in these fields.

"In many cases local conditions such as the quantity of water produced, depth of the well, and age of the properties warranted classifying these wells as stripper wells. In general it can be said that ⅔ to ¾ of the total oil that the well will produce has been produced at the time that it is classified as a stripper well although in some instances, wells are classified as stripper wells almost from their initial production. In some states where laws specifically specify wells to be unrestricted because of depth and limitation of production, all such wells were generally classified as stripper wells."

INCOME AND EXPENSE

REVENUE	11	OIL SALES
	12	GAS SALES - NATURAL
	13	GAS SALES, CASINGHEAD, RESIDUE & LPG
	14	TOTAL REVENUE NET
OPERATIONS	15	FIELD SUPERVISION
	16	FIELD OVERHEAD EXPENSE
	17	CAMP OPERATIONS
	18	HOUSE MAINTENANCE
	19	FOREMAN AND CLERICAL LABOR - DIRECT
	20	PUMPING AND SWITCHING LABOR
	21	ROUSTABOUT AND OTHER LABOR
	22	TRANSPORTATION-HAUL MEN, MATERIAL AND TOOLS
	23	TRANSPORTATION - GRADING AND OTHER
	24	FUEL - ELECTRICITY
	25	FUEL - GAS
	26	FUEL - OTHER
	27	POWER SERVICE
	28	WATER
	29	SUPPLIES
	30	CONTRACT - PUMPING AND SWITCHING
	31	CONTRACT - TANK CLEANING
	32	CONTRACT - GENERAL LEASE WORK
	33	TRAVELING EXPENSE
	34	MISCELLANEOUS OTHER EXPENSE
	35	WASTE WATER EXPENSE - LEASE FACILITIES
	36	WASTE WATER EXPENSE - COMPANY SYSTEMS
	37	WASTE WATER EXPENSE - OUTSIDE FACILITIES
	38	OIL TREATING EXPENSE - CHEMICALS
	39	OIL TREATING EXPENSE - OTHER
	40	AIR GAS LIFT SERVICE
	41	GAS INJECTION EXPENSE
	42	WATER FLOODING EXPENSE
	43	VACUUM SERVICE
	44	WELL TESTING EXPENSE
	45	SWABBING EXPENSE
	46	SERVICES RENDERED - CREDIT
	47	TOTAL OPERATING EXPENSE - GROSS
	48	OPERATING EXPENSE CHARGED TO PARTNERS
	49	OPERATING EXPENSE CHARGED BY PARTNERS
	50	TOTAL OPERATING EXPENSE - NET
MAINTENANCE	51	REPAIRS - COMPANY LABOR (WER)
	52	REPAIRS - TRANSPORTATION (WER)
	53	REPAIRS - MATERIAL (WER)
	54	REPAIRS - CONTRACT (WER)
	55	REPAIRS - OTHER EXPENSE (WER)
	56	REPAIRS - WELL SERVICING EQUIPMENT (WER)
	57	REPAIRS - COMPANY LABOR (LER)
	58	REPAIRS - TRANSPORTATION (LER)
	59	REPAIRS - MATERIAL (LER)
	60	REPAIRS - CONTRACT (LER)
	61	REPAIRS - OTHER EXPENSE (LER)
	62	MAINTENANCE OF PRODUCTION (RECONDITIONING)
	63	RECONDITIONING INJECTION WELLS
	64	TOTAL MAINTENANCE AND REPAIRS - GROSS
	65	MAINTENANCE AND REPAIRS CHARGED TO PARTNERS
	66	MAINTENANCE AND REPAIRS CHARGED BY PARTNERS
	67	TOTAL MAINTENANCE AND REPAIRS - NET
	68	TOTAL PRODUCTION EXPENSE - NET

STRIPPER-WELL operation is a continual fight to keep oil production (oil sales) up and expenses down. This table lists some of the principal production expense items.

Where and How Much Stripper Wells Pumped

State	Total Bbl. Crude Production	Stripper Production Bbls. 1953	Product. Acres, Stripper	Number Stripper Wells	Av. Bbl. Per Well Day, 1953	Primary Stripper Reserves (Thousands of Bbls.)	Secondary Stripper Reserves (Thousands of Bbls.)	Total Reserves 1-1-54 (Thousands of Bbls.)
Arkansas	29,867,000	7,364,669	54,152	2,641	7.63	37,244	54,180	91,424
California	367,431,000	56,807,000	114,189	15,239	10.21	622,549	614,000	1,236,549
Colorado	32,366,000	476,358	10,400	127	10.27	35,770		35,770
Illinois	59,241,000	53,858,000	416,040	21,511	6.85			530,867
Indiana	13,071,000	12,113,006	58,970	4,301	7.71	65,865	25,250	91,115
Kansas	113,219,000	29,748,136	465,970	20,620	3.95	271,548	74,785	346,333
Kentucky	11,567,000	4,000,000	72,000	16,740	6.54	47,000	50,000	97,000
Louisiana	256,251,000	9,794,581	75,675	4,992	5.37	78,897	44,600	123,497
Michigan	12,381,000	10,129,682	133,430	4,073	6.81	58,075	25,000	83,075
Mississippi	35,483,000	526,281	6,760	171	8.43	1,955		1,955
Missouri	38,733	38,733	7,000	98	1.08	350		350
Montana	11,742,000	5,163,115	280,020	3,028	4.67	28,773	13,250	42,023
Nebraska	6,350,000	223,192	1,420	71	8.61	2,125		2,125
New Mexico	70,585,000	5,745,100	279,280	3,148	5.00	323,649	67,500	391,149
New York	3,770,950	3,770,950	88,710	30,432	.339	29,241	63,950	93,191
Ohio	3,695,000	3,695,000	125,000	15,345	.659	31,896	7,000	38,896
Oklahoma	203,794,000	68,111,659	831,670	48,044	3.88	789,083	799,220	1,588,303
Pennsylvania	10,930,799	10,930,799	625,211	76,339	.392	112,000	428,195	540,195
Tennessee	36,000	36,000	185	36	2.74	150		150
Texas	1,023,806,000	89,850,880	570,990	50,457	4.88	814,942	854,855	1,669,797
North Texas		18,341,980	139,140	18,552	2.71	200,300	421,300	621,600
West Central		5,297,610	23,684	5,921	2.45	47,368	82,895	130,263
Texas, Other		66,211,290	408,166	25,984	7.12	567,274	350,660	917,934
West Virginia	3,020,000	3,000,000	211,264	12,955	.634	41,854	51,820	93,674
Wyoming	84,981,000	5,564,107	45,454	2,184	6.98	59,493	113,250	172,743
OTHERS	9,103,000							
Total	2,362,729,482	380,947,248	4,475,790	332,552	3.14	3,983,326	3,286,855	7,270,181

FPC Leaves Gas Producers in Dark

- Order 174-A is modified, but new directive leaves more questions than answers for the natural-gas industry
- Commission says no more third-party, favored nation clauses will be considered in rate setting after May 1

Bertram F. Linz

WASHINGTON. — The natural-gas producer selling his gas at the well head still does not know if he comes under Federal Power Commission regulation.

The FPC last week finally modified its controversial order 174-A, but the new order—174-B—left more questions than it answered. It did dispose of escalation clauses in gas-purchase contracts. Most of them have been outlawed.

Lawyers who practice before the FPC find little comfort for independent producers and gatherers in the order. Their filing requirments were eased, but the relief came only 2 weeks after they had already filed applications.

Here, in brief, is what the new order provides:

. . . **Who is subject to regulation** was left for determination by decisions in the cases involving Shell Oil Co., Deep South Oil Co., and Humble Oil & Refining Co. which the FPC will hear January 10.

. . . **Escalation clauses** of the third-party, favored nation, and similar types will not be accepted for consideration after May 1.

. . . **Gatherers** who buy from several producers will make rate and certificate filings for all their suppliers, relieving the producers of that obligation.

. . . **Conservation orders** of state oil and gas agencies will be recognized by the FPC and abandonments of service under such orders will be allowed.

. . . **Filing procedures** for small producers are simplified, both as to initial rates and increases.

The new order is designed to deal with all the points raised in petitions for review of the previous orders. Lawyers say court proceedings brought against the FPC are now ineffective. Companies which have attacked 174-A in the courts will have to amend the proceedings or file new cases.

But it is possibly an effort on the part of the commission to fully acquaint the industry with all angles of the proposed regulations in advance of the hearings scheduled for January 11.

Producer defined? . . . The new order defines an independent producer as any person "who is engaged in the production or gathering of natural gas and who transports natural gas in interstate commerce or sells natural gas in interstate commerce for resale, but who is not primarily engaged in the operation of an interstate pipeline."

But, just what producers fall into that category will have to be determined by the commission's decision in the Shell, Deep South and Humble cases. The question, in the view of the commission majority, is a matter of basic interpretation of the law rather than administrative procedure.

"We recognize the desirability for clarification of jurisdiction in the light of the Phillips decision," the commission said. "This is of serious concern to many independent producers and clarification is desirable not only to prevent unnecessary filings, but to assist those persons having honest doubt as to whether they come under statute.

COMMISSIONER DIGBY dissents . . .

We have no desire to extend our jurisdiction beyond statutory limits. This problem is substantive and not procedural and cannot be dealt with here. Hearings are scheduled and will be concluded at the earliest practicable time in order to facilitate prompt determination of jurisdictional questions."

Digby dissents . . . This position was challenged by Commissioner Seaborn L. Digby, who said a positive determination at this time would greatly advance orderly regulation. He expressed the opinion that a jurisdictional sale of natural gas should be defined "as a direct sale of natural gas in interstate commerce for resale, which sale of natural gas shall include all natural gas dedicated by contract for sale in interstate commerce for resale." No other sales of gas should be subject to the jurisdiction of the FPC, he said.

Commissioners Nelson Lee Smith and Frederick Stueck agreed in principal with Digby in concurring opinions, but voted with Commissioners Jerome K. Kuykendall and Claude L. Draper to postpone the issue for determination by decision.

Bypassing the jurisdictional question left unsettled the status of well head sales of gas and also that of wet gas sold before processing. There is some feeling in the industry that the latter may require amendment of the Natural Gas Act to define more clearly the types of gas to which it applies.

Escalation . . . The biggest issue dealt

FPC Loses Court Round

WASHINGTON. — The Federal Power Commission failed last week to secure dismissal of Union Producing Co.'s petition for a stay of enforcement of Order 174-A.

Rejecting the argument that the suit was premature since no order specifically directed at the company had yet been issued, U. S. District Judge Alexander Holtzoff denied the commission's motion for dismissal and ordered trial of the case to determine whether a permanent stay should be issued.

The case is expected to be set for hearing after the turn of the year.

Union Producing asked for the stay December 1, the deadline for the filing of applications by natural-gas producers for authorizations to sell to interstate pipelines. The commission moved to dismiss the petition, and argument was heard December 14. *(Oil and Gas Journal, December 13, page 99.)*

with in the new order was that of escalation. Without indicating any change in its procedure for dealing with rate changes already on file, the commission announced that escalation clauses in contracts submitted beginning May 1, 1955 will not be considered in support of any certificate application. They will not be given effect if they provide for adjustment of the seller's price because of changes in the prices received by the purchaser upon resale, or if they call for adjustment of the seller's price because other purchasers in the same producing area pay more.

Lawyers interpret this as outlawing third-party favored-nation clauses and similar escalations. There is a possibility that first-party, favored-nation clauses, under which a buyer extends to other producers an increase in price paid to one supplier, and automatic, periodic price increases would be permitted.

The provision raises many uncertainties, however. Its applicability to present contracts, what position the commission will take on contracts filed between now and May 1, and the effect on the fair field price allowed in the Panhandle case, is not defined in the order.

In general, it is felt the new provision has no effect on present suspensions, totaling about 26, in which the commission will review price-change clauses.

Here, again, Digby split with his fellow commissioners, contending all fixed escalations contained in arm's-length contracts "in existence on the effective data of Order No. 174-A should be accepted as a part of the original rate and . . . not subject to suspension." Such acceptance of the original schedules, including periodic changes in the price of gas, Digby said, would not be an approval of the rate as fair and reasonable, but would simply treat the changes as part of an original rate schedule not subject to suspension.

Conservation element . . . The commission revised its regulation barring the abandonment of service without FPC permission by quoting the section of the Natural Gas Act relating to abandonment, and adding a proviso that nothing in the rules shall be construed as interfering with or preventing compliance with valid conservation orders of a state agency.

Although there is some ambiguity in this wording there is a possibility the expressed intent not to "interfere" with state conservation orders might extend to recognition of the minimum field price regulations of state agencies.

Single filing . . . The new provision permitting operators to make filings for their producers will apply to operators of wells under co-ownership; to a group of producers who have unitized for production and sale; or to an operator of a processing plant if payments to producers represent a percentage of the proceeds of the sale of the gas by the operator.

This will leave the FPC still in control of the price and the sale before the gas moves into the large interstate pipelines.

Filing through a single operator is not mandatory. Individual operators may make separate filings if they so desire.

The commission stipulated that points and issues raised by petitions for rehearing of Orders 174 and 174-A which are not covered by the new order shall be denied.

Attorneys practicing before the commission believe 174-B is a "final" order and the 60-day period for the filing of suits against it runs from the date of its issuance, December 17.

Magnolia Appeals Case

HOUSTON. — Magnolia Petroleum Co. is asking a U. S. appeals court to pass on an action which indirectly attacks the Federal Power Commission's authority to control natural-gas producers.

Magnolia filed an appeal in the U. S. Fifth Circuit Court of Appeals after District Judge Ben C. Connally turned down the company's request for a declaratory judgment to determine its rights under the Natural Gas Act.

Magnolia asked Judge Connally to prevent Texas Illinois Natural Gas Pipeline Co. from prosecuting a complaint before the FPC. The court refused to take the action. Texas Illinois has asked the FPC to prevent Magnolia and other La Gloria field producers from cutting off gas sales under escape clauses in their contracts.

The federal judge said his court had no jurisdiction because the dispute should first be ruled on by the Federal Power Commission.

NPC Lauded By McKay

WASHINGTON. — Cooperation of the oil and gas industry with the Government through the National Petroleum Council was praised last week by Interior Secretary Douglas McKay.

McKay expressed his appreciation in announcing the membership of the council for 1955. All current members were reappointed.

"In the Department of the Interior, which is responsible for the nation's natural resources, we must look at our problems in the broad perspective," McKay wrote in his letter of appointment. "We are interested in the future and welfare of this country, and the National Petroleum Council makes many valuable contributions which signify a real interest in this objective."

The first meeting of the 1955 council will be held in Washington late next month, at which time reports on several important investigations are to be submitted.

New Gages Tested

Instruments are designed to aid secondary recovery

WASHINGTON.—New instruments to measure bore holes and determine the height of liquid in wells, developed at the Bartlesville, Okla., petroleum experiment station, were announced last week by the Bureau of Mines.

The two instruments were designed principally for use in secondary-recovery operations. But they can be used in primary production and may find applications in other fields, the bureau said.

Measurement of bore holes has become increasingly important with the advent of secondary-recovery operations, as in situations where injection wells are being completed by pulling the original casing and cementing 2-in. tubing at the top of the producing zone. Heretofore, there has been no way of measuring the hole below the tubing because existing instruments were too large in diameter.

The bureau's caliper operates on a single-conductor armored electric cable. It has four measuring arms which, when the instrument has been lowered into a well, can be opened and closed from the surface. As now designed, it can measure bore holes up to 36 in. in diameter, but could be designed to measure holes more than twice that size.

The liquid-level gage, valuable in ascertaining the proper production method, is less than 2 in. in diameter and about 6 ft. long. It operates on a single-conductor armored cable. A float inside the gage moves upward when the liquid level is reached, changthe flow of electric current from the surface, and a meter on the surface indicates the depth at which the gage makes contact with the liquid.

The gage provides a positive method for finding and following a surging liquid level and makes it possible to detect changes in the velocity of a moving level more accurately than in the past.

Rubber Plants Selling

Disposal commission reveals sales contracts with buyers; now it's up to Justice Department and Congress to approve

WASHINGTON.—Racing against the clock, the Rubber Facilities Disposal Commission was signing up buyers of the government-owned synthetic rubber plants last week.

Up against a December 27 deadline, the commission hoped to develop a sales program which would meet the requirements set by Congress and at the same time satisfy the Department of Justice that privately owned industry would be competitive and free of monopolistic potentials.

By the end of the week the commission was assured it would be successful in getting contracts for the sale of properties capable of producing the 500,000 long tons a year of GR-S and 43,000 tons of butyl rubber. This was set by Congress as the minimum which must be covered by any sales program.

In the first sales, announced piecemeal as buyers signed up, over nearly 700,000 tons of copolymer capacity and all the petroleum butadiene plants except one at El Segundo, Calif., and one of the two butyl plants were contracted for. The prices to be paid for the facilities were not disclosed and are not expected to be made known until the commission sends its report and program to Congress next month.

Sales announced by the commission were as follows:

Copolymer plants (GR-S) . . . Port Neches, Tex., now operated by B. F. Goodrich Co., to Goodrich-Gulf Chemicals, Inc., equally owned by B. F. Goodrich Co. and Gulf Oil Co. Capacity 90,000 long tons; cost at December 31, 1952 (substantially representative of original construction cost plus additions), $21,664,000.

Los Angeles, Calif., now operated by Midland Rubber Co., to Shell Chemical Co. Capacity, 89,000 long tons; cost $15,822,000.

Borger, Tex., to Phillips Chemical Co., present operator. Capacity, 63,000 long tons; cost $10,438,000.

Naugatuck, Conn., to U. S. Rubber Co., present operator. Capacity 21,600 tons; cost $10,123,000.

Port Neches, Tex., now operated by U. S. Rubber Co., to Texas-U. S. Chemical Co., equally owned by Texas Oil Co. and U. S. Rubber Co. Capacity, 88,000 tons; cost $14,326,000.

Akron, Ohio, to Firestone Tire & Rubber Co., present operator. Capacity, 30,000 tons; cost $7,630,000.

Lake Charles, La., to Firestone Tire & Rubber Co., operator. Capacity, 99,600 tons; cost $15,846,000.

Baton Rouge, La., to Copolymer Corp., operator. Capacity, 48,000 tons; cost $9,276,000.

Akron, Ohio, to Goodyear Synthetic Rubber Corp., operator. Capacity, 15,200 tons; cost $8,168,000.

Houston, Tex., to Goodyear Synthetic Rubber Corp., operator. Capacity, 99,600 tons; cost $15,246,000.

Louisville, Ky., operated by Kentucky Synthetic Rubber Corp., to American Synthetic Rubber Corp., composed of 29 companies, including the present operator. Capacity, 44,000 tons; cost $8,932,000.

Butadiene plants . . . Port Neches, Tex., now operated by Neches Butane Products Co., one-half to Goodrich-Gulf Chemicals, Inc., and one-half to Texas-U. S. Chemical Co. Capacity 205,000 short tons; cost $58,357,000.

Borger, Tex., to Phillips Chemical Co., present operator. Capacity 74,000 tons; cost $42,239,000.

Los Angeles, Calif., to Shell Chemical Corp., present operator. Capacity, 48,000 tons; cost $20,281,000.

Houston, Tex., operated by Sinclair Rubber, Inc., to Food, Machinery & Chemical Corp. Capacity 74,000 tons; cost $31,547,000.

Lake Charles, La., operated by Cities Service Refining Corp., to Petroleum Chemicals, Inc., a joint subsidiary of Cities Service Oil Co. and Continental Oil Co. Capacity 63,000 tons; cost $17,703,000.

Baton Rouge, La., to Copolymer Corp., operator. Capacity 23,000 tons; cost $7,711,000.

Baytown, Tex., to Humble Oil & Refining Co., operator. Capacity 46,000 tons; cost $18,772,000.

Butyl plants . . . Baytown, Tex., to Humble Oil & Refining Co., operator. Capacity 43,000 long tons; cost $24,690,000.

Alcohol butadiene plants . . . Kobuta, Pa., to Koppers Co., Inc., operator. Capacity 128,000 short tons; cost $45,553,000 including facilities costing $22,223,000 leased by the Reconstruction Finance Corp. to Koppers Co.

Styrene plant . . . Los Angeles, Calif., operated by Dow Chemical Co., to Shell Chemical Corp. Capacity 62,500 tons; cost $15,131,000.

Chemical plant (D.D.M.) . . . Naugatuck, Conn., to U. S. Rubber Co., present operator. Capacity 2,400 tons; cost $386,000.

This week, on the deadline day, the commission had for disposition only two GR-S plants, the 122,000-ton plant at Institute, W. Va., now operated by B. F. Goodrich Co., and the 44,000-ton plant at Baytown, Tex., operated by General Tire & Rubber Co.; the 50,000-ton butyl plant at Baton Rouge, La., operated by Esso Standard Oil Co.; an 87,000-ton alcohol butadiene plant at Louisville, Ky., operated by Union Carbide & Carbon Co., and a 50,000-ton petroleum butadiene plant at El Segundo, Calif., operated by Standard Oil Co. (California) in tandem with the Shell Chemical Corp. plant at Torrance. The El Segundo plant would need improvement of product quality to meet specifications.

Most, if not all of these plants are expected to be sold.

The next step . . . The negotiated contracts will be sent over to the Department of Justice this week for study of the details from the angle of antitrust law enforcement.

If approved by the department, the program will be submitted to Congress, to which the commission must report by January 27. Congress has 60 legislative days in which to act to disapprove either the entire sales schedule or individual sales. If Congress takes no action within the 60 days, the sales automatically are approved. If it rejects the program, or so much of it as to bring sales below the required minimum capacity, the federal Government stays in the synthetic rubber business indefinitely *(Oil and Gas Journal, December 13, page 99)*.

Fuels Group Named

Coal committee takes no stand on gas act

WASHINGTON.—A new committee on competitive fuels was set up last week by the National Coal Association to be the sole authority through which coal producers will speak on the question of oil and gas imports.

The nine-man group was given a three-point program, but the question of supporting the natural-gas industry in its effort to secure legislation against federal control was not included (see page 100).

"The coal industry is unnecessarily and severely injured by the importation of residual oil," explained Tom Pickett, executive secretary of the as-

sociation. "Therefore, we favor a quantitative restriction on such imports and an equalization of tariffs on residual oil with other petroleum products.

"The coal industry is against and will fight the dumping of natural gas at a price less than the average cost at the point of consumption, plus a reasonable profit.

"The coal industry is for control of importation of natural gas to prevent it from supplanting domestic fuels."

It was not clear what motivated the coal producers to ignore the Natural Gas Act. They previously called for amending the law.

Pickett said the committee gave consideration to the Supreme Court decision in the Phillips Petroleum Co. case but "at this time has taken no position on the question of whether or not that decision should be retained or reversed."

Small Refiner Championed

WASHINGTON.—Extension of the Defense Department's new purchasing policies to small refiners was urged last week by A. W. Scott, president of the National Petroleum Association.

In a letter to Thomas P. Pike, assistant secretary for supply and logistics, Scott pointed out that the new plan to review procurement programs is in line with NPA recommendations to the Cabinet Committee on Energy Supplies and Resources Policy.

The NPA recommended the Government adopt a policy of purchasing a substantial part of its military requirements from small refiners located outside of the congested industrial areas and, whenever possible, dependent on local sources for their crude supplies.

ASPPA Awards Contracts

WASHINGTON.—Award of contracts for approximately 16,400,000 bbl. of aviation fuel, 1,400,000 bbl. of motor fuel and 1,055,000 bbl. of diesel oil was announced last week by the Armed Services Petroleum Purchasing Agency.

Orders for aviation fuel went to 31 companies. The contracts were negotiated and prices were not disclosed.

On competitive bids, the largest contracts went to Suntide Refining Co., Corpus Christi, Tex., for 49,266,000 gal. of 83/91 grade for $6,327,540 and 14,490,000 gal. for $1,518,552.

The largest contract for diesel oil went to the Corpus Christi Refining Co., Corpus Christi, for 36,750,000 gal. of marine grade for $3,158,750.

WATCHING WASHINGTON

Bertram F. Linz

Congress in Spotlight

This is the time of year when interest in Washington centers on the administration's legislative program.

For the oil and gas industry this year, it is a period of uncertainty. Several important issues are on the fire, and the industry would like to know what the White House thinks about taxes, oil imports, natural-gas regulation, and the depletion allowance.

Only one indication of the President's program has been given so far—there will be no further cuts in taxes if the administration can prevent them.

The first disclosures of Eisenhower's stand on problems affecting the oil and gas industry may come late next week in his message to Congress on the state of the Union.

The situation next year will be rather tough, with a Republican administration dependent upon a Democratic Congress for enactment of its program. The Democrats will cooperate with the White House on foreign affairs and defense, but domestic issues are the raw material from which campaign ammunition is made and is less likely to attract bipartisan support.

Fortunately for the industry, oil and gas production is largely in the Democratic states whose congressional delegations are well aware of what it takes to maintain healthy and vigorous activity. Less fortunate, perhaps, is the traditional tendency of northern and southern Democrats to split on domestic issues of an economic nature.

Expansion Studied

New industry expansion programs are expected to be announced by the Office of Defense Mobilization next spring.

Most of the current programs for the oil and other industries are scheduled for completion by the end of next year, and defense officials are raising their sights and preparing to shoot at targets as far way as 1958 and 1960.

The theory underlying the planning of new expansions is that a growing economy needs ever increasing productive ability.

The industry will be shooting close to its programed target by the end of 1955, but neither the ODM nor the Oil and Gas Division believes it should stop there.

The immediate concern of the planning agencies still is the problem of wartime transportation of oil to the East Coast. This has long since ceased to be a matter of industry responsibility, and the thinking now is directed to the best method of providing for such transportation by the Government itself and how it can be presented in such a way that Congress will be persuaded to provide the necessary funds.

It Takes Two to Tango

State Department officials are hopeful that a more promising climate for American private investment in Latin America may develop out of the recent meeting of the Inter-American Economic and Social Council in Rio de Janeiro.

But such a development will have to override resentment created by the announcement that the U. S. will not be able to extend large-scale economic aid to Latin America in the face of a greater need for it in the Far East.

The South American countries have long criticized the alleged neglect of their interests under the various aid programs adopted since the war, even though it has been explained repeatedly that the billions of dollars spent have been directed to strengthening resistance to aggression and subversion in areas threatened by the Communists, and Latin America is not considered to be so endangered.

In lieu of direct grants and loans, the United States has offered to supply all the technical assistance needed to help the industrialization of Latin American countries and greater assistance in financing American companies going into the Southern Hemisphere to develop natural resources or industrial opportunities.

It was made clear, however, that to make such programs effective, it would be necessary for the South American governments to reform nationalistic laws which make foreign investment unattractive.

Several countries already have indicated an interest in attracting American capital and know-how, realizing that their own resources are not adequate to develop their oil and industrial potentialities.

New Gas Pipeline . . .

. . . from Beaumont to McAllen could usher first large scale shipments of Mexican gas across border to U. S. markets

HOUSTON.—With Canadian natural gas inching its foot into the U. S. market door, it appeared here last week that a definite effort is being made to introduce Mexican gas to our markets also.

Coastal Transmission Corp., a new subsidiary of Delhi Oil Corp., Dallas, will build a 400-mile, 30-in. gas transmission line from central Hidalgo County in South Texas to the Beaumont area. The western terminus of such a line would be less than 10 miles from the Mexican border and the gateway to northeastern Mexico's gas fields.

Coastal officials decline to elaborate on where they intend to get gas for the $40 million line, but at least some would come from South Texas fields where Coastal representatives are now negotiating with producers. A second company, believed to be a Clint Murchison interest—as are both Delhi and Coastal—is reportedly dickering with Petroleos Mexicanos for gas from the Reynosa area.

This report is given credence by the fact the Dallas operator is already pipelining gas in Mexico, is in good standing with Pemex, and has talked gas deals with the official Mexican oil agency in the past. An inflated asking price for the gas has always been the bottleneck for any such deal.

The imminent entry of Canadian gas into the markets of the Pacific Northwest may compel Pemex to revise its estimates of the worth of Mexican gas *(The Oil and Gas Journal, December 20, page 58).*

What Coastal says . . . President of Coastal is John O. Sue, who retired officially this week as assistant manager of the production department of Humble Oil & Refining Co. Sue was in charge of Humble's gas operations and has had about 30 years experience in the gas business. W. J. Bowen, supervising engineer for Delhi in Dallas, is vice president of the company.

Sue said in Houston that Coastal was organized "principally for purchasing gas for resale in interstate and intrastate commerce, and for transporting gas for producers to markets outside the producing area."

In Dallas, Bowen elaborated on this and said the company is considering four types of transmission deals and may exercise all or any of them.

The company may:

. . . Buy gas and transport it for sale in the Beaumont area to interstate transmission lines which would resell it in Midwest and Eastern markets. Big-inch lines of United Gas Pipe Line Co., Tennessee Gas Transmission Co., Transcontinental Gas Pipe Line Corp., Texas Eastern Transmission Corp., Trunkline Gas Co., and others pass within a few miles of Beaumont, and the line conceivably could deliver gas to any of them.

. . . Buy gas for resale to industrial users or distributing firms in the populous Beaumont-Houston-Port Arthur-Galveston area.

. . . Transport gas on a fee basis for the interstate lines which would buy it directly from the producers.

. . . Transport gas on the same basis for industry, including refineries, or for pipeline firms which would distribute it within the state.

Capacity . . . As now planned, the big line would have a deliverability the first year of about 350,000,000 cu. ft. daily. Coastal officials say they hope this capacity could be boosted relatively soon to 550,000,000 cu. ft. daily, which is close to maximum capacity for a 30-in. line without looping.

Plans have not yet progressed sufficiently to permit any disclosure of when Coastal expects to start or complete construction, officials say. The same holds true for financing plans.

In the past . . . The principal stumbling block in previous proposals to ship Mexican gas into the United States has been the reluctance of financial backers to place their trust in the Mexican source of gas. U. S. financial circles have been leery of Mexico's oil and gas industry since the expropriation of petroleum properties by the Mexican Government. They have regarded the government as entirely too unpredictable to back up long-term financing such as a pipeline.

In the past, financial backers have demanded an auxiliary supply of gas on the U. S. side of the border ranging up to 50 per cent of the line's capacity, before they'd talk of financing this kind of a project.

All this may not bother Murchison. He is now operating a 90-mile gas line from the Reynosa area to Monterrey, Mexico, in partnership with private Mexican interests. The line was built in 1929 by United Gas Co. to supply gas to Monterrey and was sold to its present owners in 1945.

Mexico's gas . . . If, as all reports indicate, Coastal does plan to get at least part of its gas supply from south of the border, the gas is available.

The northeastern Mexico area has been an active sector for the past 18 months. Its existing fields include Reynosa, Monterrey, Mexicano, Rio Bravo, Lomitas, Trevino, and Brasil. In addition Pemex has drilled 46 wells in the states of Tamaulipas and Nuevo Leon during the past year and brought in 43 producers, discovering five new fields.

Three of the new fields—Chapul, Villa Cardenas and 18 de Marzo—are in northern Tamaulipas, and two—Zacate and Cabeza—are in northeastern Nuevo Leon.

Transco Seeks Gas

Pipeline company joins New York exploration

NEW YORK.—Transcontinental Gas Pipe Line Corp. has entered an agreement with Dome Gas & Oil Corp. for joint exploration in Ulster County, New York, in search of new gas reserves for the New York City area.

Under terms of the contract, Transcontinental has an option to purchase any resulting gas production at the unusually high price of 27.5 cents per 1,000 cu. ft. Upon exercise of its option, Transcontinental is committed to build a 125-mile pipeline capable of transporting at least 25,000,000 cu. ft. of natural gas daily from Phoenicia, N. Y., to New York City.

First test on a 12,000-acre block covered by the agreement was started by Dome last March. The test, which is seeking gas production from the Oriskany sand at about 5,500 ft., has now reached about 4,250 ft.

If the first test, the 1 Herdman, yields gas or oil in commercial quantities, Dome has agreed to start drilling a series of wells. Until it exercises its purchase option, Transcontinental is committed to reimburse Dome for 50 per cent of the cost of drilling subsequent wells.

The 1 Herdman is in the Catskill region about 50 miles south of the nearest previous well, which was drilled by

local interests and abandoned about 1 year ago. The Dome well is being drilled with cable tools by W. H. Roeder, Bradford, Pa., contractor.

Dome Gas & Oil Corp. is a wholly owned subsidiary of North Star Oil & Uranium Corp., New York.

Transcontinental, one of the largest pipeline companies in the United States, delivers natural gas to the New York metropolitan area through a 2,000-mile pipeline from Texas. Transcontinental officials recently announced a 1955 expansion program to increase gas deliveries to eastern markets to 684 million cu. ft. daily. The expansion program would cost about $80,000,000.

Kirby Sale Approved

Stockholders authorize liquidation of company

HOUSTON.—Stockholders of Kirby Petroleum Co. have approved dissolution of the firm and sale of its properties to Continental Oil Co.

Kirby stockholders are expected to receive approximately $24,600,000 under the liquidation plan.

Conoco's offer includes $1,000,000 in cash plus three production payments to be made over a period of years *(The Oil and Gas Journal, December 6, page 81)*. The first production payment, amounting to $14,850,000, has been sold by Kirby.

Holders of Kirby's 593,000 shares of $1 par common stock of record December 27 will receive an initial liquidation dividend of $22.50 a share, company officials announced last week. The payment is to be made on or after December 29. A final liquidation dividend to be paid later is expected to boost the total to about $34 per share.

The liquidation plan provides for redemption of the 429,780 outstanding shares of 50-cent cumulative preferred stock at $10.32 a share.

The sale involves producing wells in seven states plus Kirby's royalty and its interest in two natural-gasoline and cycling plants. About 80 per cent of the company's stock is controlled by the family interests of Clint W. Murchison, Dallas, and Sid Richardson, Fort Worth.

Turner Sells Oil Interests

OKLAHOMA CITY.—Roy J. Turner, former governor of Oklahoma, has sold his interest in Harper-Turner Oil Co. and Harper-Turner Drilling Co. to a group of the companies' employes for an undisclosed sum.

Turner, who governed Oklahoma from 1947 to 1951, began his association with F. E. Harper in the companies in 1929 when the Oklahoma City field was opened. Harper is retaining his interests in the companies. The firms have producing properties in Oklahoma, Arkansas, New Mexico, Kansas, Nebraska, and Texas, and at present are operating seven drilling rigs.

Tuned to Forward Thinking

THE JOURNAL takes a great deal of pride in its ability to evaluate important trends in the oil and gas industry and report these developments to its readers. We want to do an even better job.

With this goal in mind, the Journal this week formed a rotating editorial advisory board composed of leaders in every phase of the oil and gas industry. Its members are in all geographical areas of the industry, both in the United States and abroad. They are leaders in both small and large companies, and their positions are in administrative, technical, and operating fields.

Because of the varied composition of the board, the Journal will be able to keep engineering-operating readers informed on general executive-administrative thinking in the industry, and vice versa—both will contribute.

This board will contribute to periodic discussions of general and divisional industry topics during 1955. The first one, to be published early next year, will be on "What Lies Ahead for the Petroleum Industry in 1955."

Merger Nears

Delhi-Taylor deal expected to get approval in January

DALLAS.—Directors of Taylor Oil & Gas Co. have approved the proposed merger of Taylor and Delhi Oil Corp., and only stockholder approval of both firms now is needed for the deal to go through.

It is considered likely that stockholders of the companies will approve the merger proposal in mid-January. Taylor stockholders will gather January 10 to decide the question, Delhi stockholders about January 15.

If the merger passes both tests successfully, it will go into effect February 1. Officers of the companies and the board of directors of Delhi have already endorsed the consolidation after more than 2 years of negotiations *(The Oil and Gas Journal, December 20, page 64)*.

Terms of the agreement call for merging Taylor into Delhi. The consolidated company would be named Delhi-Taylor Oil Corp. It was considered best for Delhi to be the surviving corporation due to legal mechanics.

Stock in the merged firm would be distributed on the basis of one share of Delhi-Taylor for each share of Delhi Oil and 1.37 shares of Delhi-Taylor for each share of Taylor.

As it is now set up, C. W. Murchison of Delhi would become chairman of the board of Delhi-Taylor and James L. Sewell, president of Taylor, would become president of Delhi-Taylor.

Shell Tries Nevada Again

ELY, Nev.—Shell Oil Co. next week will spud its second attempt to add to Nevada's only producing oil well.

The new location is in Railroad Valley, southeast of Ely, and about 1,500 ft. south of the state's only producer which Shell drilled. The well is producing about 250 bbl. daily.

Shell has abandoned its second well, Eagle Springs 2, after carrying it to 10,183 ft. without a show.

Ammonia Plant Operating

MEMPHIS.—Grace Chemical Co. has started operation of its $20,000,000 ammonia-urea plant near here.

Samuel W. Anderson, Assistant Secretary of Commerce, is slated to be the principal speaker at the plant's dedication January 6.

The plant will have a rated capacity for producing 250 tons daily of synthetic anhydrous ammonia, part of which will be converted into 150 tons per day of urea.

Mid-West Buys Roosevelt

GRAND RAPIDS, Mich. — Mid-West Refineries, Inc., of Grand Rapids, has purchased a majority of the common stock of Roosevelt Oil & Refining Corp., of Mt. Pleasant, Mich.

Roosevelt, which operates a 7,500-bbl. per day refinery at Mt. Pleasant, is the principal manufacturer of special naphthas and petrochemicals in Michigan and owns the largest crude pipeline system in the state.

Mid-West, owner of a 10,000-bbl. refinery at Alma, Mich., makes and markets gasoline and domestic and industrial fuel oils in southern Michigan. It also owns Michigan-Ohio Pipeline Corp., which operates a crude system between central Michigan and Toledo.

More Imports Expected

Latest data given Railroad Commission shows 13.6 per cent rise for first quarter; daily total set at 1,184,400 bbl.

CURRENT industry estimates of imports for the first quarter of 1955 have moved up in the past month. Latest reports to the Texas Railroad Commission indicate an increase in the first quarter of 13.6 per cent compared with an estimated increase of 11.2 per cent a month ago.

The total of first quarter estimates for reporting companies now stands at 1,184,400 bbl. daily compared with actual imports by these companies in the first quarter of 1954 of 1,042,500 bbl. daily.

Crude accounts for the larger part of the first quarter gain. Company estimates show a gain of 19.2 per cent for crude compared with 5.4 per cent for products.

Part of the big gain indicated for April is due to the relatively low level of imports last April.

For the first 9 months of this year, actual crude imports of the companies reporting to the commission accounted for 98 per cent of all crude imports reports by the Bureau of Mines. The companies' portion of total product imports was much less. Total product imports average 386,000 bbl. daily for the first 9 months. Company reports accounted for only 314,500 bbl. daily or 81.5 per cent of the total.

If these same ratios hold true for the first quarter of next year, total imports of both crude and products may average almost 1,300,000 bbl. daily.

Here Are Companies Import Estimates

(Thousands of barrels daily)

	Actual		Estimated or forecast*				
	Oct. 1954	Nov. 1954	Dec. 1954	Jan. 1955	Feb. 1955	Mar. 1955	Apr. 1955
CRUDE—EAST COAST:							
Atlantic Refining Co.	60.0	64.9	61.8	61.8	61.8	61.8	61.8
Cities Service Co.	13.1	23.8	17.0	29.7	30.4	21.6	33.3
Eastern States Petroleum Co.	9.7	6.4	5.3	14.3	14.3	14.3	14.3
Gulf Oil Corp.	121.0	104.0	152.0	125.0	125.0	140.0	140.0
McBride Oil & Gas Corp.	3.4	7.5	6.4	6.5	7.2	6.4	6.7
Phillips Petroleum Co.	10.0	6.1	8.9	8.9	9.8	8.9	9.2
Sinclair Oil Corp.	63.6	57.9	66.0	66.0	66.0	66.0	66.0
Socony-Vacuum Oil Co.	80.9	73.9	85.0	80.0	80.0	80.0	80.0
Southwestern Oil & Refining Co.	7.3	0.5	6.8	6.8	7.5	6.8	7.0
Standard Oil Co. of California	70.8	61.9	87.9	87.9	87.9	87.9	87.9
Standard Oil Co. (Ind.)	16.1	14.8	12.6	12.9	14.3	12.9	13.3
Standard Oil Co. (N.J.)†	85.0	79.0	79.0	79.0	79.0	79.0	79.0
Sun Oil Co.	7.3	23.0	33.9	15.9	8.0	7.2	7.5
The Texas Co.	37.0	56.2	51.2	62.2	58.9	52.2	39.2
Tide Water Associated Oil Co.	16.4	12.2	10.0	10.7	8.5	10.7	11.0
Total East Coast	601.6	592.1	683.8	667.6	658.6	655.7	656.2
CRUDE—WEST COAST:							
Socony-Vacuum Oil Co.	7.6	18.1	16.0	27.0	29.0	23.0	26.0
Standard Oil Co. of California	24.2		18.7	18.7	18.7	18.7	18.7
The Texas Co.	9.8	10.3	9.8	6.8	12.3	12.4	10.0
Tide Water Associated Oil Co.	12.9	5.5	19.4	20.4	20.4	20.4	20.4
Total West Coast	54.5	33.9	63.9	72.9	80.4	74.5	75.1
Total Crude	656.1	626.0	747.7	740.5	739.0	730.2	731.3
PRODUCTS:							
Asiatic Petroleum Co.	5.2	1.1	3.2	1.1	5.0	7.0	7.5
Eastern States Petroleum Co.	13.0	20.0	8.3	8.3	8.3	8.3	8.3
Gulf Oil Corp.	3.0	6.0	4.0	4.0	4.0	4.0	4.0
Shell Caribbean Petroleum Co.‡	117.0	137.0	165.0	175.0	165.0	125.0	95.0
Shell Oil Co.	11.5	25.7	16.8	19.0	21.0	22.4	18.9
Socony-Vacuum Oil Co.	9.7	7.3	8.2	8.2	8.2	8.2	8.2
Standard Oil Co. (Ind.)§	9.8	18.7	31.1	31.1	26.8	19.4	16.7
Standard Oil Co. (N.J.)†	159.0	195.0	206.0	215.0	215.0	215.0	176.0
The Texas Co.		3.4		5.0	6.0	9.4	9.5
Total products	328.2	414.2	442.6	466.7	459.3	418.7	344.1
Total crude and products	984.3	1,040.2	1,190.3	1,207.2	1,198.3	1,148.9	1,075.4
Bonded fuel included¶	66.9	65.9	66.6	63.5	67.8	69.4	71.0

*From company reports to the Texas Railroad Commission. †Based on quarterly estimates. ‡Imported by independent distributors. §Received through suppliers who can furnish either domestic or foreign oil. ¶Mostly duty free for bunkering ships in foreign trade.

CRUDE AND PRODUCT IMPORTS*
(Thousands of barrels daily)

	1953 (actual)	1954 (forecast)	Per cent change
October	905.7	†984.3	8.7
November	1,019.5	†1,040.2	2.0
December	1,045.4	1,190.3	13.9
Fourth quarter	989.9	1,071.9	8.3
	1954 (actual)	1955 (forecast)	Per cent change
January	1,051.3	1,207.2	14.9
February	1,091.7	1,198.3	9.8
March	989.3	1,148.9	16.1
First quarter	1,042.5	1,184.4	13.6
April	872.8	1,075.4	23.2

*From company reports. †Actual

T.G.T. to Expand

Half of $36 million plan offered for FPC approval

WASHINGTON.—The first half of a 2-year, $36,000,000 expansion program of the Texas Gas Transmission Co. was laid before the Federal Power Commission last week.

The 1955 program calls for expansion of facilities in five of the eight states served by the company at a cost of $17,500,000 and would increase the capacity of the system by 102,000 M.c.f. daily. The 1956 program, to cost $18,600,000, would add another 85,000 M.c.f. daily of capacity to give the company a total of 1,185,000 M.c.f. daily.

Next year . . . For next year, the company plans to construct nearly 90 miles of 20 and 26-in. pipeline to loop existing lines and more than 100 miles of smaller diameter pipeline in southern Indiana and three river crossings. A new 4,500-hp. compressor station is planned at Riverton, La., south of Monroe, and engines will be added at seven of the present 21 stations to give the system an additional 22,600 compressor horsepower.

Upon completion of the 1955 program, the company's 26-in. lines will be completely looped from Bastrop, La., into Kentucky, with a four-line system from Monroe, La., to Memphis, Tenn.

The company said present supply contracts with producers in East Texas, North Louisiana, and the Louisiana Gulf Coast area guarantee sufficient reserves to support the expansion.

Proposals Draw Opposition

OKLAHOMA CITY.—At least two groups of Oklahoma oil operators are expected to protest the proposed revisions in the state's oil regulations at a meeting before the Corporation Commission January 12-14.

The newly formed Oklahoma Inde-

pendent Petroleum Association, headed by Roy G. Woods, Oklahoma City, will ask the commission to help Oklahoma get a bigger share of the nation's crude market. Also invited to attend the session is a group headed by W. A. Delaney, Jr., Ada. This group has protested the proposed formula for production allowables for discovery wells.

Proposed revisions in the commission's general rules and regulations were submitted by an industry committee created by the state agency last spring *(The Oil and Gas Journal, December 20, page 69)*.

Buckeye Line Completed

COLUMBUS, Ohio.—Buckeye Pipe Line Co. has completed an 80-mile extension of its products pipeline system.

The new, 8-in. line runs from here to Lima, Ohio. It is an extension of the system running from Lawrenceville and Robinson, Ill., to Toledo, with intermediate terminals at Indianapolis, Muncie, Ind., and Lima. The first products will be moved through the line shortly after the first of the year.

Sheehan Pipe Line Co., Tulsa, was contractor on the job. Work on the line started in October.

Industry Briefs

CASPER.—Pure Oil Co. is negotiating for purchase of the W. H. Barber Co., Minneapolis, Minn. The sale hinges on a Barber's stockholders vote expected early in 1955. The proposed sales price has not been disclosed. Barber's properties include 37 wells in Wyoming's Dallas Dome and Derby fields. These wells have an average production of 350 bbl. of oil daily.

HOUSTON. — A 5,000-bbl.-per-day Houdriformer has gone on stream at the Crown Central Petroleum Corp. refinery near here. The new unit is licensed by Houdry Process Corp. Engineering and construction were handled by Blaw-Knox Co.

OIL CITY, Pa.—Petroleum-production research at Pennsylvania State University will be aided in 1955 by a contribution of $11,000 from the Pennsylvania Grade Crude Oil Association.

CHEYENNE, Wyo.—The Wyoming Public Service Commission has authorized Platte Pipeline Co. to construct an 8.1-mile, $183,000 crude line from the Gebo field in Hot Springs County to the company's Chatham pump station in Washakie County. The commission authorized a rate of 23 cents per barrel for transporting petroleum from the Gebo field to Cheyenne.

ROCKY MOUNTAIN

Sioux To Expand

Drilling, refining, and pipeline program planned

NEWCASTLE, Wyo.—Sioux Oil Co., Newcastle refining and producing firm, has mapped a $4 million expansion program for 1955 that will include boosting the company's refining capacity, laying a products pipeline, and sinking $3 million in development wells.

The company plans to drill 25 wells and build a gas-repressuring plant in Hay Creek field, Weston County, Wyoming. It recently acquired a working interest in 11,000 acres in the field that includes 20 producing wells.

Drilling the wells will be part of a move to increase the amount of Sioux production going to company refineries. The company plans to produce 40 to 50 per cent of the crude requirements for its three refineries during the next 10 years.

Sioux operates two refineries here with a combined capacity of 4,250 bbl. daily. These two plants will be expanded during the year to increase the combined capacity to 5,000 bbl. The firm also has a 600-bbl. refinery at Chadron, Neb.

Plans also are being completed for a 50-mile products line from here to Rapid City, S. D. This line will serve the Black Hills area and western South Dakota, including Ellsworth Air Force Base.

Proration Foes Organize

DENVER.—A committee has been organized to fight any legislative proposals for proration or market-demand laws in Rocky Mountain states.

At an organizational meeting here, R. S. Shannon, Jr., Shannon Oil Co., Denver, was elected chairman. Samuel Butler, Jr., Sharples Oil Co., Denver, was named secretary-treasurer.

The Rocky Mountain Oil and Gas Association has endorsed a program of backing proration laws in member states, and is campaigning for a market-demand proration law that will be submitted to the Wyoming legislature in January *(The Oil and Gas Journal, December 20, page 66)*. The association is sponsoring a series of meetings explaining the aspects of the laws.

Production Ceilings Set

DENVER.—Ceilings on production of oil and gas in the Little Beaver field in Adams and Washington counties have been established by the Colorado Oil and Gas Conservation Commission.

Production from the "J" sand of the field is restricted to 100 bbl. of oil and 100,000 cu. ft. of natural gas a day from all wells.

An order issued July 1 for the nearby Adena field was continued for another 6 months, starting January 1. This order restricts production to a maximum of 125 bbl. of oil and 150,000 cu. ft. of gas per day.

The commission also ordered 40-acre spacing of oil wells producing from the "J" sand in the White Butte field of Weld County and the Frasco field of Logan County. Gas-well spacing in the Fort Morgan field was set at 160 acres.

Lease Sale Voted

First Montana land offer in 2 years is January 18

HELENA, Mont.—The first oil and gas leases offered in more than 2 years will be put up for bidding January 18 by the Montana Land Board.

The state leases include 73 tracts totaling 37,561 acres.

The auction was voted by the board after the Montana Supreme Court 3-2 decision December 10 holding invalid a 1953 law providing leases for as long as oil or gas was produced in paying quantities.

The January 18 sale will be held under the old system which allowed successful bidders to hold leases for 20 years before they were put up for competitive bidding again.

Interest on revenue from the leases goes to the state's public schools.

Governor votes no . . . Gov. J. Hugo Aronson, a member of the board, voted against the sale.

"I believe nothing can be gained by hasty action," he said. "Certainly there is a grave doubt as to the validity of leases under present conditions and I am advised an appeal to the United States Supreme Court is contemplated by interested parties."

Aronson added that the appeal would be "for the reason not only to clarify the issue in Montana, but in North and South Dakota, the other states in the Williston basin, as well as Wyoming and Washington. Their laws were enacted under the same provisions of the amended Congressional Enabling Act as the Montana legislation."

Pembina Picks Up

Hudson Bay well may extend Cardium; Texaco gets strike

EDMONTON,—Hudson's Bay Oil & Gas Co., Ltd., has indicated discovery or extension of the Pembina Cardium oil-sand area at a wildcat in the West Pembina area about 75 miles southwest of here.

The Hudson Bay well was one of two developments during the past week in the Pembina area. Texaco Exploration Co. announced it made its first strike in the Pembina area in a wildcat on a 87,000-acre tract about 42 miles southeast of Pembina. McColl-Frontenac has a working interest in the tract.

The Hudson Bay well, 1 West Pembina, LSD 6, 34-47-10w5, is about 3 miles southwest of Stanolind-Hudson's Bay E-1 Crown, the Cardium sand oil discovery well.

A drill-stem test was run from 5,811-51 ft. Pipe recovery was 60 ft. of oil. The crew is coring below 5,878 ft.

The Texaco well, which is located in LSD 2, 1-42-6w5, flowed 22 bbl. of 40°-gravity oil an hour through a ¼-in. choke during a 3-hour test. The well was tested at 6,099 to 6,112 ft. after fracturing.

Crude Line Completed

CROMER, Man.—Trans Prairie Pipe Lines, Ltd., has completed a 13-mile, crude-oil pipeline and gathering system that is moving production from the Virden-Roselea and North Virden fields into the Interprovincial Pipe Line Co. system here.

The new line is expected to carry 90 per cent of total production in the area.

Pipeline Date Set

Westcoast plans to start work in September of 1955

EDMONTON, Alta.—Westcoast Transmission Co., Ltd., plans to start building its natural-gas pipeline from the Peace River area to the U. S. border near Vancouver, B. C., by September 15, 1955.

Officials of the firm disclosed plans at a hearing of the petroleum and natural gas conservation board. This hearing followed the announcement by Westcoast, the El Paso Natural Gas Co. and Pacific Northwest Pipeline Corp. that they have signed agreements to deliver Peace River gas to markets in B. C., northwestern U. S. and California *(The Oil and Gas Journal, December 20, page 58)*.

The conservation board was told financing arrangements for construction of the line are expected to be completed by July 15, 1955, and gas will reach Vancouver by December 31, 1956.

Export permit . . . At the board hearing, Westcoast was seeking an extension of its natural gas export permit.

Under terms of the original permit, Westcoast was to start construction of a line by December 31, 1954. Last summer the Federal Power Commission put a damper on Westcoast plans to export to the Pacific northwest by refusing a permit.

Any amendment to the original permit must be approved by the provincial government. It is expected the conservation board will forward its decision on the request to the government shortly.

Triad Tops Sale

Company pays $1,053,405 for Alberta drilling tract

EDMONTON, Alta.—Triad Oil Co. was top bidder in a December drilling reservation sale which poured $1,281,405 into Alberta's treasury.

Triad paid $1,053,405 for rights on 8,157 acres 25 miles northwest of Calgary and 15 miles northeast of the Jumping Pound gas field.

The acreage is among the highest-priced wildcat land in the province, more than $465 per leasable acre. The record is $2,000 per acre, paid by California Standard Oil Co. for land in the Rimbey area.

California Standard made the second highest bid in the recent sale when it tendered $135,035 for a 4,807-acre block near the Westerose field, about 20 miles southeast of Edmonton.

More Tests Planned

Southern Production will extend Canadian program

CALGARY. — Southern Production Co., Fort Worth, will continue its oil and gas exploration program in Alberta and British Columbia until June 30, 1958, under a new exploratory agreement reached with Canadian Atlantic Oil Co., Calgary.

The contract calls for expenditure by Southern Production of $10,000,000 in exploration, including approximately $3,000,000 spent in this year's program. Expenditures are to be at the rate of approximately $2,000,000 a year in 1955, 1956, and 1957, with the balance of about $1,000,000 to be spent in the first half of 1958.

The new contract amends an earlier agreement between the two companies signed last January. Under the original contract, Southern Production agreed to spend $5,000,000 in exploration on acreage of Canadian Atlantic, Pacific Petroleums, Sunray Oil Co., Peace River Natural Gas Co., and others in Alberta and British Columbia by June 30, 1955.

Under the new contract, Southern Production acquired one-fourth of the interest of Canadian Atlantic and the other companies in 26 projects covered by the earlier agreement. Its interest will increase to one-half wherever it completes a commercial well. Under the amended agreement, Southern Production may earn a half interest in approximately 2,900,000 acres in the Peace River area of the two provinces and in the foothills and plains areas of Alberta.

Potential market . . . Exploration in the Peace River area assumes added importance as result of the recent disclosure that 300,000,000 cu. ft. of gas per day may be transported from this region by Westcoast Transmission Co., Ltd., for delivery to the United States border *(The Oil and Gas Journal, December 20, page 58)*.

If the deal goes through, Canadian gas would be distributed to United States consumers by Pacific Northwest Pipe Line Corp. and El Paso Natural Gas Co.

Texas Allowable Jumps

Railroad Commission hikes figure over recommendations of most producers, puts state on 18-day schedule in January

AUSTIN.—The Texas Railroad Commission took the bull by the horns December 17 and hiked the state's January crude-oil production allowable a momentous 278,484 bbl. daily over that in effect December 4.

The increase, one of the biggest ever in Texas, places the initial allowable for next month at 3,216,123 bbl. daily —up 254,341 bbl. daily from the initial December figure. It was accomplished by increasing this month's producing-day schedule of 16 days to 18 for January.

The commission based its action on declining crude and products stocks, climbing demand, and colder weather in the country's big consuming areas. It also was obvious that the commission had an eye on the gradually increasing oil-import rate.

Outlook encouraging . . . E. O. Thompson, chairman of the commission, told purchasers at the hearing that a "general spirit of optimism for the new year prevails in the industry, dimmed only by the threat of increased imports."

He urged company representatives to push domestic rather than foreign crude, adding that "Texas would like to sell oil as well as Abdullah." There is a likelihood, he said, that the United States may experience a bad winter this year. If Texas isn't prepared to meet such an eventuality, imported oil will fill the gap, he said.

Citing the statistical situation, Thompson said the Bureau of Mines has estimated the demand for Texas crude in January will be 2,770,000 bbl. daily, 30,000 bbl. higher than for December.

"Crude stocks as of December 3 were 267,869,000 bbl., or 14,704,000 bbl. below the stocks of the same date 1 year earlier . . . a reduction of 5.2 per cent . . . The gasoline inventory for the past week was reduced by 725,000 bbl., which is unusual for this season of the year.

"With weather 18 per cent colder than a year ago, heating-oil demand seems to be good, and a surprising demand for gasoline is evident. Distillates are down over 7,000,000 bbl. Kerosine and residual both are off. The total drop (in products stocks) was about 11,000,000 bbl. in 1 week, which is most refreshing and encouraging."

Caution urged . . . Though voting for the 18-day producing schedule, Commissioner W. J. Murray, Jr., advised the industry to recognize that cutbacks would become necessary if stocks begin to pile up. Though doubtful about the situation, he said he was bowing to the superior experience and wisdom of his colleagues.

JANUARY ALLOWABLE

District—	January	Increase from Dec. 4
1—Southwest	55,906	2,622
2—Gulf Coast	156,996	16,093
3—Gulf Coast	495,992	35,985
4—Southwest	274,357	21,378
5—East Central	50,990	4,235
6—Outside E. Texas	132,598	11,089
6—East Texas field	243,010	24,678
7B—West Central	180,085	14,379
7C—West Central	217,360	22,215
8—West Texas	1,038,490	99,464
9—North Texas	258,661	24,853
10—Panhandle	111,678	1,493
Total	3,216,123	278,484

Texas Dubious of New Year

AUSTIN.—Outlook for the oil and gas industry in Texas next year is "not too bright," according to the Oil and Gas Division of the Texas Railroad Commission.

In its year-end report, the division pointed out that total demand for crude and products in the United States is expected to increase 3 to 5 per cent in 1955. But ability to supply that demand is expected to increase more sharply.

If Texas is to maintain its present producing status, the report observed, state producers will "have to receive a share of the national demand more in keeping with the Texas percentage of the nation's reserves." Texas, with prorated wells on a 16-day production schedule during December, has been hardest hit by controls necessary to keep production within the bounds of market demand, the report pointed out.

The current year has proved somewhat disappointing to Texas producers. Whereas the nation's total demand for petroleum and its products was expected to gain 2.9 to 3.5 per cent, the division predicts that actual demand will be about 1 per cent greater than the high established in 1953.

Deep Test Staked

Hunt Oil plans 18,000-ft. rank Pecos County wildcat

DALLAS.—Hunt Oil Co. has staked location for another deep wildcat in little-tested area of southern West Texas, 20 miles south of Fort Stockton.

Designated 48 Elsinore Royalty Co., the well will be carried to 18,000 ft. on a 145,000-acre block in Pecos County. The drill site is in Section 51, Block D, GC&SF Survey.

Nearest production is Puckett field, to the northeast, which produces gas from Ellenburger at depth to 15,000 ft.

Hunt's 47 Elsinore, 13 miles northwest of 48, is drilling below 17,585 ft. This test was originally projected to 17,000 ft.

Forest Will Test Pecos

FORT STOCKTON, Tex.—Forest Oil Corp. will drill three 6,500-ft. tests in northeast Pecos County on a 40,000-acre block which now has only shallow oil production.

Exploration rights were obtained from Cardinal Oil Co., jointly owned by White Eagle Oil Co. and Panhandle Oil Corp. The leases now have shallow Permian production, and the deep possibilities have not been explored.

Forest is committed to start the first test on a 2,400-acre tract by February 4, 1955. Upon completion of the initial well, Forest will earn deep rights to half of the 2,400-acre block in a checkerboard pattern of 80-acre tracts.

Each subsequent well is to be started on a separate tract within 90 days after completion or abandonment of the previous well. Each of them will earn Forest an additional 960 acres on a similar checkerboard pattern.

Forest may terminate the contract at any time by forfeiture of $25,000 for each unfinished test.

Tidelands Fight Expected

California Legislature faces offshore-leasing problem; conservation bill given about 50-50 chance of passage

D. H. Stormont

LOS ANGELES.—Oil measures will figure prominently in the California Legislature when it convenes next month at Sacramento for its regular session.

Heading the list will be a move to liberalize statutes regulating leasing and development of state-owned submerged lands. Because of restrictions in existing laws, little offshore drilling can be done until they are removed.

Some form of conservation regulations may be introduced during the session. The industry is divided as to how rigid such statutes should be, or if they are needed or desired at all. Richfield Oil Corp. has been carrying on an active public education campaign for months. Other than this, there has been little demand for such legislation.

Another bill may be introduced which will clarify the legality of unitizing city oil properties with those of private companies. Long Beach needs such a measure before it can carry out extensive pressure maintenance at its Long Beach Harbor oil properties, or permit development of oil reserves believed to underlie the downtown area.

A move also may be made to keep the state's gasoline tax at 6 cents gallon. Next June 30 the tax is scheduled to drop 1½ cents. Failure to develop other sources of revenue will probably result in extension of the temporary portion.

Offshore legislation . . . Under existing statutes, little of the submerged lands out to the 3-mile limit can be leased for oil development. The State Lands Commission, the agency authorized to administer lands owned by California, can grant leases for drilling only in those cases where it can be shown that drainage to adjacent private properties is occurring.

For this reason, only about 23,000 acres of the 2,000,000 submerged acres the state owns are under lease. Since receiving title to its tidelands in June 1953, the state has recognized only two situations in which offshore drilling was deemed necessary to protect its interests.

These were at West Montalvo and Rincon. At the latter, Richfield Oil Corp. earlier this month was awarded a lease on a 1,175-acre tract lying seaward from existing shore-based development. This action is still being contested in the courts. In the other action, Standard Oil Co. of California was granted a lease offshore from the West Montalvo field.

Currently, the agency is planning to ask for bids on two tracts offshore from Newport Beach. Monterey Oil Co. and Humble Oil & Refining Co. are developing a city-granted lease off Newport Beach.

The Western Oil and Gas Association and some of its member companies already have campaigns under way to educate the public on the need for changes in these regulations. Chief opposition is expected to come from Santa Barbara and other coastal-resort cities.

Legislation permitting drilling from other than "earth-filled" structures also will be sought. Under existing regulations portable and stationary-steel platforms such as are being used along the Gulf Coast are not permissible. Work must be either from earth-filled islands —and even these may not be allowed in most cases—or be slanted from upland drill sites.

Changes also may be sought in the basis for bidding. Under existing procedures competitive bidding is on a royalty basis, with the specified minimum being 16⅔ per cent. Some company officials would like to see a fixed royalty, with the competitive portion of the bid being in the amount of bonus offered.

Still other portions of any such measure may stipulate how close to shore drilling may be performed. Such a provision would be of vital interest to the coastal cities, some of which would like to see drilling limited to "2 miles beyond the horizon."

Conservation statute . . . Opinion of some company officials is that next year probably will see the legislature receive a bill relative to oil conservation. Should it not be approved, or should none be introduced, there is the possibility such a proposal may be placed on the ballot at next November's election by the initiative-petition route.

Just prior to the outbreak of the Korean War, two independent organizations conducted a statewide campaign for conservation legislation. Neither of the two, Oil Producers Agency and the San Joaquin Valley Oil Producers Association, has joined Richfield in its current effort.

Outcome of any conservation measure entering the legislative hopper is uncertain, even with an almost solid industry effort behind it. Twice such measures have been passed; twice California voters killed them on referendum petitions. Because of this, most oil people give any new measure little more than a 50-50 chance of being adopted.

Legal Hurdle Ahead

Rincon residents object to Richfield's offshore plans

SACRAMENTO.—Richfield Oil Corp. will have to overcome another legal obstacle before it can begin work on drilling islands offshore from the Rincon field, Ventura County.

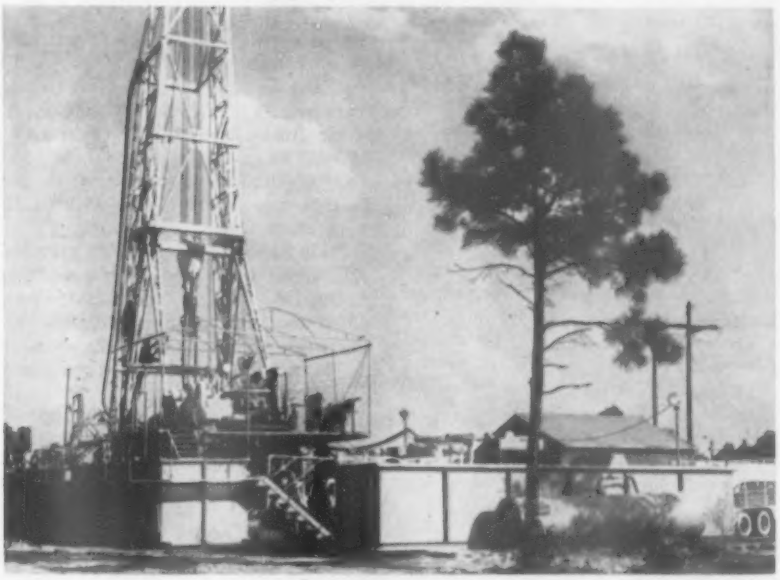
Only a few hours after the state Lands Commission awarded the company a lease on the 1,175-acre submerged tract, a Sacramento Superior Court issued a restraining writ. It was granted H. B. Martin, San Diego, who said he represented many owners of Rincon ocean-front property.

Recognizing that the Supreme Court considered Monterey Oil Co.'s earth-filled island satisfactory in a Seal Beach suit, Martin contends Richfield's earth and rock islands are not "filled lands" as defined in the Public Resources Code. Superior Judge J. L. Henry will hear arguments in the case January 10.

The background . . . Richfield filed the highest bid with the Lands Commission last July, but only this month was awarded the lease. A protest filed by the second highest bidder, a group made up of Shell Oil Co., Union Oil Co., Continental Oil Co., and Superior Oil Co., held up the bid award.

Attorneys for the four-company group, whose formula bid was less than half that of Richfield's, contended theirs was the highest qualified bid because "realistically considered, it is bound to return to the state the highest revenue."

The bid factor of 5.2375 submitted by Richfield and applied to the commission royalty rate formula constituted about 80 per cent royalty on a 100-bbl. producer. The group's attorney claimed that "if for any reason they were forced to produce as much as 123 bbl., the royalties would take 100 per cent of production and the company could file a quitclaim deed to let the lease revert to the state.



DRILLING ON A TOWN LOT in Conroe. Humble plans 30 to 40 more wells to drill up the field over the next 10-month period. The shallow wells can be drilled in 2 weeks.

Townsite Field Defined

Drilling program of 30 to 40 wells within next 10 months should complete development of new Conroe townsite field

William P. Sterne

CONROE, Tex. — Conroe's townsite field has been defined on virtually all sides and should be completely drilled up within 10 months.

Humble Oil & Refining Co., leading operator in the field, says it may eventually cover an area 3,500 ft. wide and 2 miles long. Full development will require 30 to 40 more wells to bring the field total to 60 to 70 wells.

"Boom" didn't materialize . . . The Conroe townsite play, about 24 miles west of the old Conroe producing area, could have developed into a real "boom" had not the Conroe city council, under the leadership of Mayor Bill Newton (an oil man in his own right) passed an ordinance to prevent fast, haphazard, and dangerous "boom town" development.

Montgomery County oil men say the city ordinance is a good thing, could well serve as a model for other towns experiencing townsite oil plays, and is most effective, although it is also most stringent.

As they put it, "we anticipated a boom and got busy to prevent the usual 'bust' which was sure to follow. Consequently, an orderly plan of development is assured."

Discovery . . . The field was discovered in January by Moran Utilities and Garflo Oil Corp., with 1 Hunt & Floyd. Bottomed at 8,805 ft., this well was completed in the main Cockfield sand through perforations from 5,128-31 ft., for 134.7 bbl. of 36.2°-gravity oil per day on a ⅛-in. choke. Tubing pressure was 1,150 psi. and gas-oil ratio 1,350 to 1.

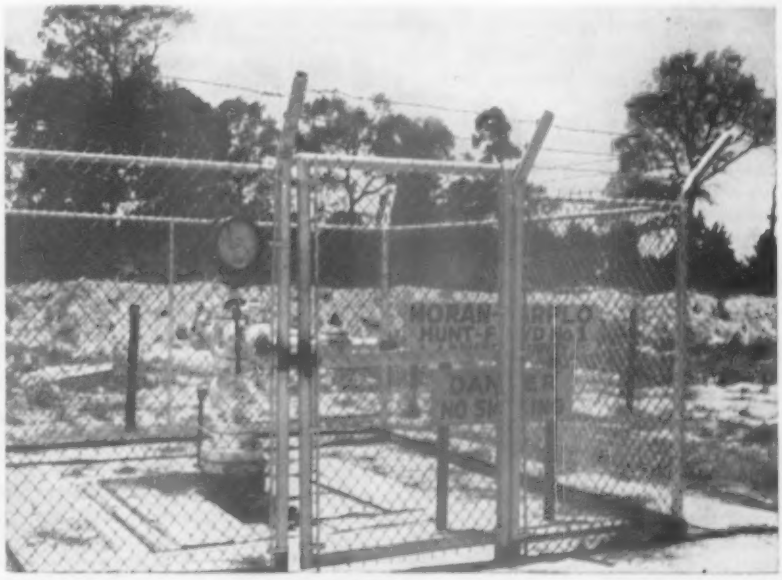
Following the Moran discovery, Humble, which had long been active in the Conroe area, started its drilling program.

Conroe townsite field produces from two zones, both in the Cockfield (Yegua) sand of Eocene age. The field contains 22 producing and 3 drilling wells. Twenty wells were drilled as straight holes and five as directional holes. One is a dual completion.

Production . . . Daily production is approximately 700 bbl. Wells are prorated by the Texas Railroad Commission to 83 bbl. per day.

A total of 156 units have been formed under the Conroe city ordinance plan of development. Only one well can be drilled on each 20 acres. Getting the numerous lot owners to pool their acreage for a certain test in a certain block has been a terrific problem for the operators.

Humble had been using three rigs, but due to delays and difficulties in getting clear titles to certain tracts in the drilling units, a program calling



DISCOVERY WELL was Moran Utilities-Garflo Oil Corp. 1 Hunt & Floyd. This well sparked the new drilling play in January when it was completed for 134.7 bbl. of 36°-gravity oil.

only for two rigs is contemplated to complete the field development.

Fault zone . . . The field is an anticlinal structure, with a fault running from the southwest to northeast. Production has been on the south side of the fault, or in the general southwestern portion of the town.

The two main pays of the field are the main Cockfield, a sand topped at approximately 5,100 ft. and having oil-water contact at 5,140 ft. It is approximately 25 ft. thick, with 35 ft. of oil column. The other sand is the upper Cockfield, which lies about 50 ft. higher. Oil-water contact on this zone is 4,990 ft. It has a gas cap, with gas-oil contact at 4,950 ft. This sand is relatively thin, with only about 8 to 10 ft. thickness as a maximum.

Dual completions set . . . Humble has one well producing from both zones, and it will be the practice in the future to put as many wells on dual completion as possible.

Humble plans to drill five directional holes soon from one surface location. This will be necessary because the town-lot sites, under which the wells will be bottomed, are occupied by homes and business buildings.

A 6,000-bbl. tank battery has been constructed by Humble on the western edge of the town and all oil produced is flowed into these tanks. It is then moved to the Baytown refinery by pipeline. A similar tank battery is to be erected in the south part of the field, outside the city limits, some time next year.

Moran Utilities et al. plan to drill at least one more well next year on acreage held on the northern flank of the field.

Coastal Depth Record Set

HOUSTON. — The Texas Gulf Coast's drilling depth record, which had stood since 1945, has been broken in a wildcat test being drilled by Magnolia Petroleum Co. in the Big Hill area, southern Matagorda County.

Magnolia's deep test, 1 Le Tulle, is down to 17,001 ft., 346 ft. below the previous depth record of 16,655 ft. established in a wildcat test drilled by Phillips Petroleum Co. in the Millican area of Brazos County. The Phillips test, 3 Schoeps, was abandoned as a dry hole in the Wilcox section. Magnolia's well, located near the coast, still is in the Frio formation.

Deepest test ever drilled in Texas is Gulf Oil Corp. 1 Northrup, rank wildcat in Reeves County, in the far western part of the state. It reached a depth of 18,609 ft. before being plugged back for testing of a shallower formation.

Gas Deal Signed

Pipeline company to build gathering system in Texas

CORPUS CHRISTI.—South Texas Oil & Gas Co. has negotiated a 20-year contract for sale of an estimated $16,000,000 worth of natural gas to Tennessee Gas Transmission Co.

The purchaser has agreed to build the necessary pipeline facilities to gather the gas from South Texas fields. Construction is scheduled to start soon.

Under terms of the agreement, South Texas Oil & Gas will sell production from approximately 22,000 acres of leases in Jackson, Victoria, and Wharton counties. The firm has completed 15 wells on these properties with a combined open-flow potential of more than 400,000,000 cu. ft. of gas daily.

Additional productive acreage in Jim Wells County also is involved in the agreement.

Tennessee Gas initially is to take 10,000,000 cu. ft. of gas daily, paying rates current in each area. The amount of gas taken will be renegotiated annually, based on the usual 1,000,000 ft. per 10 billion cubic feet of reserves; the price will increase periodically under standard escalation provisions.

South Texas Oil & Gas Co. started operations in northern Jackson County early in 1953. The firm anticipates that additional drilling will substantially increase its proved gas reserves in that area.

The purchase assures Tennessee Gas important new reserves for its rapidly expanding markets in the heavily populated northeastern section of the country.

The company operates a major trunk system extending from the southern tip of Texas along the Gulf Coast and up to New England, a distance of more than 2,000 miles.

Tennessee Gas recently completed a 26-in. looping program on its main line through Ohio. This is part of a continuing expansion program to increase its gas deliveries in the East.

Production Starts

Mississippi condensate area opened by gas line system

HATTIESBURG, Miss. — Another large sector of southern Mississippi's widespread Maxie-Pistol Ridge gas-condensate area, in Forrest and Pearl River counties, is being placed on production following connection of Ohio Oil Co.'s new gas-gathering system with United Gas Pipe Line Co.'s 20-in. outlet for the field.

Ohio's system, serving wells in the Maxie sector, is the second for the area. Gulf Refining Co.'s system, serving the Pistol Ridge sector, has been in operation since June.

Under the new allowable schedule set up for the field by the Mississippi State Oil and Gas Board, United will be permitted to take 2,696,000,000 cu. ft. of gas during January, or an average of 86,967,740 cu. ft. per day. Of the total 1,581,000,000 cu. ft. will be from the Maxie sector, and 1,115,500,000 cu. ft. from Pistol Ridge.

Prior to the market outlet provided by United Gas Pipe Line Co., gas-productive wells in the Maxie-Pistol Ridge area were shut-in at completion. There are 20 gas-condensate wells in the Maxie sector, and 24 in the Pistol Ridge portion.

Discovered as separate fields, the two have been joined in an active development program with combined productive area now extending more than 10 miles from east to west and 2 to 3 miles from north to south.

Allied Completes New Unit

ORANGE, Tex.—Allied Chemical & Dye Corp.'s Nitrogen Division has completed a new ethanolamine unit at its petrochemical plant here.

Commercial production of monoethanolamine, diethanolamine, and triethanolamine is expected to start by mid-January. Ethylene oxide, the plant's basic chemical, will be reacted with outside ammonia in manufacture of the three products.

Construction of the unit was begun last July by Austin Co., Houston. Plans for the new unit were revealed last May at dedication of the original plant *(The Oil and Gas Journal, May 31, page 49)*.

Storm Delays Line in Gulf

EUGENE ISLAND, La.—Continuing stormy weather has forced Brown & Root, Inc., construction crews laying the world's longest submarine pipeline to suspend operations until next spring.

Crews working in water from 15 to 25 ft. deep had completed about 35 miles of the 48-mile, 12-in. oil and gas gathering system when work was stopped.

Brown & Root is laying the line for Magnolia Petroleum Co., Continental Oil Co., and Newmont Oil Co. from Burns Terminal, Saint Mary's Parish, Louisiana, through Blocks 45-51 in the Eugene Island oil and gas area and on out at an angle to Block 126.

The line, when finished, will carry up to 50,000 bbl. of oil daily *(The Oil and Gas Journal, December 13, page 95)*.

WORLD-WIDE OIL REPORT

OIL EXPLORATION IN PAPUA . . . Three helicopters to carry men and materials over the swamp and jungle areas are being used by seismic and geological parties in their search for oil. Here is shown shot-hole drilling by portable equipment.

Foreign Advances Outstrip Those in U. S.

All Divisions Record Gains in 1954

by Dahl M. Duff
International Editor

- Reserves—Estimates are considerably above those of a year ago.
- Exploration—Activity is widespread and intensive, with old prospects being re-examined.
- Production—Increases in 1954 range in the neighborhood of 8 to 10 per cent.
- Refining—Capacity up 6 per cent, with total now above 7 millions barrels daily.
- Politico-legal—Outlook has improved, with several long-standing disputes amicably settled.

FURTHER substantial gains have been made in the magnitude of petroleum industry operations outside the United States in 1954.

Foreign crude-oil reserves are considerably above the estimates of a year ago. Exploration activity is widespread and intense, and many prospects regarded as offering no possibilities a decade ago are being reexamined.

Crude-oil production and petroleum consumption abroad show increases this year in the 8 to 10 per cent range—gains which are sizable though less than those during the Korean War boom 3 and 4 years ago. Foreign refining capacity is estimated to have risen 6 per cent during the year to a year-end total of nearly 7,200,000 bbl. daily.

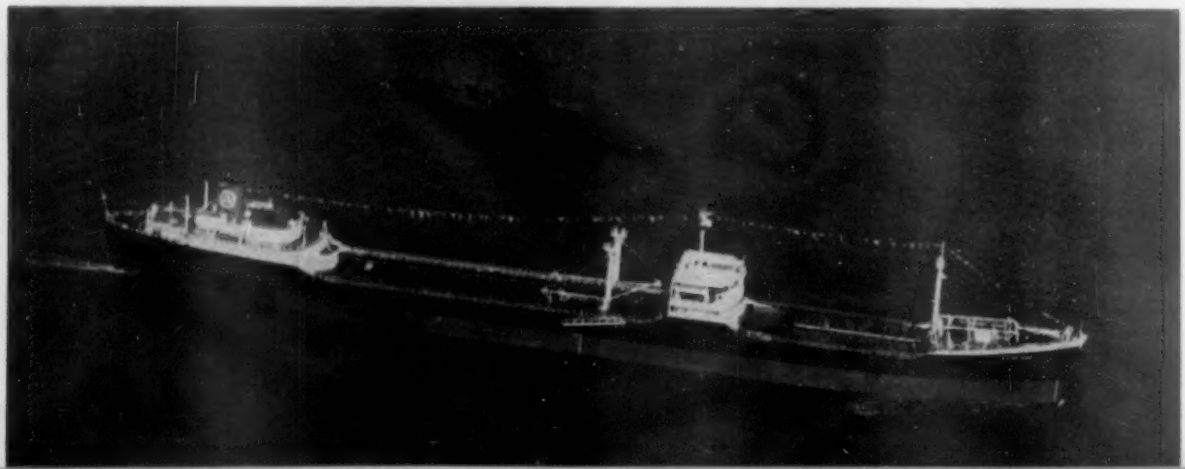
These and other statistical reports bear out the fact that the oil business in most branches of its activity is growing at a faster rate abroad than it is in the United States. In the Eastern Hemisphere, the postwar development of the vast reserves of the Middle East has been spurred by the existence of a large marketing potential. Industrialization and a rising standard of living in many foreign areas have encouraged petroleum-industry expansion.

The politico-legal outlook for the petroleum industry abroad also has improved during the year just ended. The overshadowing event was the settlement of the Iranian

JOURNAL SUMMARY OF WORLD-WIDE

COUNTRY	RESERVES	WELLS		PRODUCTION			REFINING			
								Capacity, 1,000 bbl. daily		
	Proved bbl. (1,000's)	Total producing 1954	Drlg. Nov. 1954	1,000 bbl. per day avg. for 1954	Per cent differ. 1953	Cum. bbl. in 1,000's to 7-1-54	No. oper. refrs.	Crude distillation	Cracking — Thermal	Cracking — Catalytic
Western Hemisphere:										
Argentina	410,000	1,285	47	79.5	3.0	550,292	16	186.1	65.4	0
Bolivia	45,000	41	6	4.5	246.0	7,888	4	12.3	0	0
Brazil	60,000	250	8	2.6	9.0	4,060	9	105.8	29.5	19.7
Canada	2,850,000	6,315	176	255.0	—6.0	405,253	39	587.4	183.8	168.0
Chile	55,000	23	5	4.6	50.0	4,424	1	20.0	13.4	0
Colombia	570,000	1,599	22	109.4	3.0	673,576	3	39.5	16.5	15.1
Cuba	3,000	50	2	0.1	1,000.0	5,100	3	7.7	2.4	0
Ecuador	28,000	1,330	9	8.5	6.0	58,175	2	5.4	0	0
Mexico	1,750,000	1,338	82	232.0	15.0	2,826,303	8	243.5	32.0	0
Netherlands W. I.	0	0	0	0	0	0	2	640.0	393.0	44.0
Peru	225,000	3,053	21	47.0	10.0	458,895	3	47.5	15.2	0
Trinidad	280,000	2,685	27	64.5	14.0	489,570	3	115.0	35.0	15.0
United States*	28,944,800	491,520	4,563	6,340.0	—1.9	48,905,926	330	8,437.3	2,571.7	2,830.0
Uruguay	0	0	0	0	0	0	1	28.0	2.0	7.0
Venezuela	10,930,000	7,680	107	1,874.0	7.0	7,624,492	14	528.3	85.5	0
Total	46,150,800	517,169	5,075	9,021.7	—0.1	62,013,054	438	11,003.8	3,445.4	3,098.8
Europe and Africa:										
Algeria	5,000	47	9	1.6	—18.0	1,383	0	0	0	0
Belgium	0	0	0	0	0	0	7	100.1	27.4	14.0
Denmark	0	0	0	0	0	0	3	0.9	0	0
Egypt	92,000	131	4	37.8	—17.0	208,606	2	49.0	6.4	0
France	100,000	495	26	10.8	53.0	28,058	13	491.1	76.5	49.1
French Morocco	15,000	90	9	2.4	2.0	3,308	1	2.1	0	0
West Germany	435,000	2,645	106	51.5	16.0	142,721	25	262.5	36.1	58.2
Italy (inc. Sicily)	90,000	20	32	1.4	—20.0	3,176	32	453.7	57.2	22.0
Netherlands	90,000	248	6	17.8	13.0	33,404	2	237.0	45.7	33.0
Norway	0	0	0	0	0	0	1	1.8	0	0
Portugal	0	0	2	0	0	0	1	25.4	0	10.0
South Africa	0	0	0	0	0	0	1	17.3	2.0	6.3
Spain	0	0	3	0	0	0	3	85.7	11.7	0
Sweden	0	0	0	0	0	0	3	35.8	7.4	0
Switzerland	0	0	0	0	0	0	1	4.0	1.0	0
United Kingdom	4,200	222	7	1.2	6.0	6,192	14	618.4	38.4	120.5
Total	831,200	3,898	204	124.5	3.6	426,848	109	2,384.8	309.8	313.1

One of the largest and most powerful tankers ever to enter New York moves up the North River. She is the W. Alton Jones, 38,000-ton tanker of Cities Service Co.



RESERVES, PRODUCTION, REFINING

COUNTRY	RESERVES	WELLS		PRODUCTION			REFINING			
								Capacity, 1,000 bbl. daily		
	Proved bbl. (1,000's)	Total producing 1954	Drlg. Nov. 1954	1,000 bbl. per day avg. for 1954	Per cent differ. 1953	Cum. bbl. in 1,000's to 7-1-54	No. oper. refrs.	Crude distillation	Cracking — Thermal	Cracking — Catalytic
Middle East:										
Aden	0	0	0	0	0	0	1	120.0	0	12.0
Bahrain	215,000	90	2	30.1	1.8	159,336	1	186.5	35.2	21.0
Iran	15,000,000	42	1	43.0	81.0	2,676,503	2	502.5	75.0	25.0
Iraq	14,250,000	74	13	625.0	—0.6	1,030,767	5	46.7	16.6	0
Israel	0	0	3	0	0	0	1	84.0	43.0	0
Kuwait	30,000,000	156	3	942.0	11.0	1,239,691	1	30.0	0	0
Lebanon	0	0	0	0	0	0	2	17.8	0	0
Qatar	1,500,000	24	2	97.9	24.0	108,648	1	0.6	0	0
Saudi Arabia	36,000,000	139	7	952.0	14.0	1,781,497	1	189.0	24.0	0
Neutral Zone	429,000	15	2	18.7	0	2,100	0	0	0	0
Turkey	65,000	5	5	1.1	163.0	805	1	7.2	0	0
Total	97,459,000	545	38	2,709.8	9.2	6,999,347	16	1,184.3	193.8	58.0
Asia-Pacific:										
Australia	1,000	0	7	0	0	0	7	149.3	5.2	34.7
Burma	45,000	74	2	3.5	0.2	293,000	1	3.0	0	0
Formosa	0	0	0	0	0	0	1	15.0	2.0	0
India	50,000	592	6	7.0	11.0	51,500	2	33.7	5.7	5.1
Indonesia	1,900,000	1,931	(¶)	208.0	(†)	1,461,320	5	214.0	59.5	0
British Borneo	525,000	311	(¶)	100.0	(†)	339,995	1	47.3	0	0
Japan	52,000	3,572	15	5.7	—0.2	94,004	16	147.4	9.0	3.7
New Guinea	115,000	35	4	11.4	(†)	9,603	0	0	0	0
Pakistan	20,000	28	5	5.3	23.0	3,114	1	4.0	0	0
Total	2,708,000	6,543	85	340.9	2.3	2,252,536	34	613.7	81.4	43.5
Total free world	147,149,000	528,155	5,402	12,196.9	2.0	71,692,685	597	15,186.6	4,030.4	3,513.4
Russia and controlled areas‡	10,387,000		(§)	1,347.6	15.1		90	1,481.0	342.0	50.0
Total world	157,536,000			13,544.5	3.1		687	16,667.6	4,372.4	3,563.4

*American Petroleum Institute figure for January 1, 1954. †Indonesia, British Borneo, and New Guinea were reported as one unit in 1953. ‡Includes U.S.S.R. (9,500,000,000), Austria (300,000,000), Romania (400,000,000), Hungary (70,000,000), Albania (30,000,000), China (25,000,000), Czechoslovakia (10,000,000), Poland (22,000,000), and Yugoslavia (30,000,000). §Includes U.S.S.R. (1,140,000), Romania (110,000), Russian occupied zone of Austria (62,000), Hungary (16,000), Poland (5,000), China (5,000), Yugoslavia (4,000), Albania (3,100), and Czechoslovakia (2,500). ¶Total of 46 for Indonesia and British Borneo.

A night view of the Aden refinery of Aden Petroleum Refinery, Ltd. Shown are the crude unit No. 2, flare stack, crude unit No. 1, and part of the tank farm.

DRILLING IN EASTERN VENEZUELA . . . Father and son pause to watch operations at this drilling rig in San Joaquin field.

controversy in August. The Iranian agreement is a tribute to the ingenuity of the government and industry figures who participated in the negotiations. In Latin America there have been increasing signs that barriers to private and foreign capital may be lowered. A long-standing legal dispute was settled in Egypt, a petroleum law drafted in Libya, and new legislation abolishing the state exploration monopoly passed in Turkey.

Crude-oil reserves . . . Continued enlargement of the huge fields in the Persian Gulf area has raised total Middle East crude-oil reserves to nearly 100 billion barrels.

These increases, together with gains in other of the world's producing countries, bring estimated Free World crude reserves to more than 147 billion barrels. In terms of present production, Free World reserves now represent a 33-year supply.

Some oil men talk of the center of gravity of the world industry shifting to the Middle East because of the tremendous accumulations and the great productivity of the fields in this region. Such statements take on weight if considered on the basis of reserves alone.

Middle East crude reserves have increased to the point where they currently make up 66 per cent of the Free World total, including the United States. Again last year, increases in reserves, measured in millions of barrels elsewhere, were tallied in the billions in the Persian Gulf region. The nearly 20 billion barrels estimated to have been added to Middle East reserves last year meant a rise averaging some 55 million barrels daily.

The world's No. 1 oil country on the basis of reserves is Saudi Arabia. Most of this country's petroleum resources lie in Greater Ghawar field which has 600,000 proved acres and will have some 1,115,000 acres proved when fully developed throughout its full likely area. Some more optimistic estimates of Saudi Arabian reserves, including Ghawar, Abqaiq, and the world's largest offshore field at Safaniya, range up to 50 billion barrels.

Kuwait's large increase in reserves is attributed to the additional development in the apparent Burgan extensions at Magwa and Ahmadi Ridge. The 15 billion barrels listed for Iran—a figure which dates back before the 1951 nationalization—is regarded as a highly conservative estimate. Some additional oil has been discovered at Murban on the Trucial Coast but a reliable estimate of reserves awaits further drilling.

Along with the sharp gains in Middle East reserves, substantial increases have been made during the past year in many other of the world's oil countries. Venezuela is considered to have added close to a billion barrels, and an increase of similar magnitude is credited to Canada. Another large gain has been made in West Germany. Although the Parentis discovery in France does not now appear as good as originally believed, it is responsible for the more than tripling of the reserves of metropolitan France during the past year. The crude oil found in Sicily is considered to represent a reserve in the 75 to 100-million-barrel range.

Production . . . During 1954, non-Communist crude-oil production outside the United States increased more than half a million barrels over the previous year. This was a gain of 9.7 per cent, as compared to 7.3 per cent in 1953, 7.1 per cent in 1952, and 11.9 per cent in 1951. In contrast to a decline in crude production in the United States, output abroad during 1954 not only continued to gain but did so at an even greater rate than the two previous years.

As expected, the Middle East scored in sharpest increases in oil production. The 2,710,000 bbl. daily produced in this region in 1954 was 9.2 per cent higher than the output of the preceding year. It is interesting to note that the tremendous reserves and rising production of this region are maintained with a minimum drilling effort. Excluding such geologically distinct areas as Israel, Turkey, and Egypt, there are only about 32 rigs operating in the entire Middle East.

Encouraging gains in crude production were reported in a number of other countries in 1954. During the second half of the year, output of France and Italy began to reflect commercial operations in the newly discovered areas in these countries. Egypt's production dropped back, but output rose to a new all-time high in West Germany, the Netherlands, and several countries of the Western Hemisphere, including Trinidad, Canada, and Bolivia.

Improved conditions in the export market for heavy fuel oil lifted crude production in Venezuela and Mexico out of the depressed levels which characterized producing operations in these countries during 1953.

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WORLD-WIDE OIL

A special report on all phases of the industry in all parts of the world, outside the United States

by Dahl M. Duff, The Journal's International Editor

Middle East and Eastern Mediterranean . . .

BAHRAIN

Area, sq. miles	250	Value	$0.2120
Population	120,000	Refining cap., B/D	186,500
Capital	Manama	Production, B/D	30,190
Currency	Indian Rupee	Producing fields	2
Reserves, bbl.	215,000,000		

PETROLEUM-industry operations on the 250-sq. mile island of Bahrain in the Persian Gulf consists of a single producing field, relatively small by Middle East standards, and one of the largest refineries in the Eastern Hemisphere. The operating company is Bahrain Petroleum Co., Ltd. (Standard Oil Co. of California and The Texas Co.) which is a member of the Caltex group. The territory is an independent shaikhdom under protection of the British Government by treaty relationship.

Bahrain field has a settled production which since 1948 has been stabilized at slightly more than 30,000 bbl. daily. The company uses high-pressure gas from a lower formation for pressure maintenance in the oil reservoir. There are two pay zones, one Cretaceous at 2,000-2,500 ft. and the other Jurassic (the so-called Bahrain fourth pay) at around 4,500 ft. The latter is produced from only a few of the approximately 90 active wells.

Several years ago the company drilled two deep wells, both unsuccessful, and carried out some exploratory work offshore. This year, Bapco projected at least one deep test to be drilled in the hope of finding an oil ring around the deep gas formation. Drilling being carried out is providing additional field wells increasing the number of take points to obtain better distribution on the pressure decline. In its annual report to the Bahrain shaikh, the company pointed out it had done some survey work in a water-covered area to the east of Bahrain, but that the unsettled boundary question continued to prevent exploratory work in the main area of interest.

Bahrain is an ancient Persian Gulf trading center long known for its pearling industry. Its capital, Manama, still is a principal commercial city of the Persian Gulf. Bapco's headquarters are at Awali where it has built a modern community complete with all the necessary services such as schools, housing, and hospitals.

The Bahrain refinery is on the east coast of the island, a few miles from Awali. It has processed up to 230,000 bbl. daily, supplementing the Bahrain production with crude delivered from Saudi Arabia through a 34-mile pipeline, part of which runs under the Persian Gulf. Virtually all the plant's production is taken in the export trade.

BAHRAIN PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Bahrain zone	1932	2,200	88		6	1	29,700	157,157,517	33.5	Cretaceous ls.
Fourth Pay	1936	4,500	2		1	1	300	2,179,281	36.5	Jurassic ls.
Total Bahrain			90		7	2	30,000	159,336,798		

BAHRAIN REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	—Special processing—
Bahrain Petroleum Co., Ltd., Awali, Bahrain Persian Gulf—Bahrain	186,500	21,000	35,200	[1]A-100,000, P-1,600, [2]V-29,900

(1) Long tons per year. (2) 23,000 bbl. due for completion in 1955.

NOTE: Abbreviations used in refining statistical tables are as follows: A, asphalt; Alky, alkylation; C, coke; Hydro, hydrogenation; L, lubes; P, polymerization; R, catalytic reforming; V, vacuum distillation. All coke capacities reported in tons per day.

IRAN

Area, sq. miles	628,060	Value	$0.03125
Population	20,000,000	Refining cap., B/D	502,500
Capital	Teheran	Production, B/D	43,000
Currency	Rial	Producing fields	8
Reserves, bbl.		15,000,000,000	

THE settlement of the Iranian nationalization controversy, after more than 3 years of deadlock and shutdown of the industry, was clearly the most important single event in the international petroleum industry during 1954. Shah Mohammed Riza Rahlevi signed the agreement October 29, following its approval by the Iranian Parliament, and Iran immediately started rebuilding its once-flourishing oil-export business.

Iran was the first country of the Middle East to find crude-oil production. William Knox d'Arcy, an Englishman who had made a fortune in Australia, obtained the original concession in 1901. When oil was discovered in 1908, Anglo-Persian Oil Co., Ltd. (later Anglo-Iranian Oil Co., Ltd.) was organized to exploit the production. In 1914 the British Admiralty entered into a long-term fuel-oil contract with Anglo-Persian, and the British Government bought controlling interest in the company. Anglo-Iranian stock at present is held 56 per cent by the British Government, 26 per cent by Burmah Oil Co., Ltd., and 18 per cent publicly.

Fourth Largest Oil Country

Anglo-Iranian built Iran into the world's fourth-largest oil-producing country, with a peak output of around 700,000 bbl. daily. At Abadan, in southwestern Iran, the company developed a completely integrated, self-contained community and constructed what later became the world's largest refinery, a 525,000-bbl.-daily-capacity facility.

Relations between the Iranian Government and the company began to deteriorate in 1950. The previous year an agreement revising previous concession arrangements and sharply increasing the company's total payments had been negotiated by the government and the company. However, a clamor against the company increased as rabid nationalists began blaming it for nearly all the country's political and economic troubles. In March 1951 the prime minister, General Razmara, was assassinated, and the extreme nationalist, Dr. Mohammed Mossadegh, placed in the office. A measure nationalizing the properties of Anglo-Iranian was quickly approved.

In the 3 years that followed, the economy of the country went steadily downhill as the Iranian Government discovered it was impossible to market any substantial volume of its oil without the cooperation of the major international oil companies. The last of the British staff of the company was expelled in the fall of 1951, and producing and refining operations reduced to a fraction of what they had formerly been. The vast facilities of the company were operated by Iranian engineers to supply Iranian internal demand and the minor export shipments which were taken by independent interests in Italy and Japan, despite the fact that Anglo-Iranian published world-wide warnings that it continued to lay legal claim to production from the properties.

Oil Dispute Became Major Problem

The Iranian oil dispute meanwhile became one of the major problems of the American and British governments. The political aspects of the controversy revolved around the fear, held particularly by the U. S. Government, that the internal turmoil was creating conditions which would allow Iran's Communist party to overthrow the Mossadegh Government and seize power. Five high-level attempts were made by the U. S. and British governments and the World Bank to settle the dispute, but all of them broke against the stubborn refusal of Dr. Mossadegh to compromise on such basic issues as who should exercise control of the properties and how much compensation should be paid Anglo-Iranian.

A new political atmosphere favorable to the settlement of the dispute arose in August 1953 when Dr. Mossadegh and his followers were removed from control of the government in an Army-supported uprising which was touched off when the shah fled from the country. The new prime minister, Gen. Fazollah Zahedi, a moderate, pledged himself to seek an equable solution of the oil problem. Careful discussions seeking a basis for solution of the dispute were then initiated in London and Teheran by Herbert Hoover, Jr., a partner in the

IRAN PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Aghajari	1937	4,870							35	Olig., Mio. ls.
Gach Saran	1928	800							32	Olig., Mio. ls.
Haft Kel	1928	1,700							38	Olig., Mio. ls.
Lali	1938	4,500							36	Olig., Mio. ls.
Masjid-i-Sulaiman	1908	1,270							38	Olig., Mio. ls.
Naft-i-Shad	1923	1,940							42	Olig., Mio. ls.
Naft-Safid	1934	4,460							36	Olig., Mio. ls.
Pazanun	1937									
Total Iran							(1)71,900			

(1) Gross production, of which 35,000 bbl. daily was recycled.

IRAN REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	—Special processing—
National Iranian Oil Co.:[1]				
Abadan	500,000	25,000	75,000	
Kermanshah	2,500			
Total Iran	502,500	25,000	75,000	

(1) Operated by Iranian Oil Refining Co.

MIDDLE EAST

Two-thirds of the Free World's crude reserves are concentrated in this strategic region . . . Potential for further increases is enormous since many sections still untested . . . Production, averaging better than 2,700,000 bbl. daily in 1954, gains at faster rate than any other major world oil area . . . Saudi Arabia takes No. 1 rank in output and reserves, regaining lead over Kuwait that it lost in 1953 . . . 1955 outlook is for a stand-still in Saudi Arabia, Iraq, and Kuwait, while the Iranian industry is reactivated . . . Problems in the Middle East are political, not operational . . . Utmost diplomacy constantly needed to smooth points of friction occasionally arising between government and companies . . . A. S. Onassis' preferential tanker contract with Saudi Arabia meets bitter opposition of industry and western governments . . . Some doubt now if agreement will ever be made effective on original basis . . . Iranian operations gradually getting under way after 3-year shutdown . . . Settlement agreement leaves legal ownership with Iran, but vests operation rights in eight-company international group.

former exploration firm of Hoover, Curtice & Ruby, who acted as a special representative of the U. S. Secretary of State.

One necessary preliminary step toward a settlement was taken in the early months of this year in London when eight large oil companies, including Anglo-Iranian, organized themselves into an international oil consortium for the purpose of dealing with the Iranian Government. This group was formed under the direction of the U. S. and British governments, and the American participants acted with antitrust clearance from the U. S. Department of Justice. The shareholders in this undertaking were: Anglo-Iranian, 40 per cent; Royal Dutch-Shell, 14 per cent; Cie. Francaise des Petroles, 6 per cent, and 40 per cent held equally by five American companies—Standard Oil Co. (N. J.); Standard Oil Co. of California; Socony-Vacuum Oil Co., Inc.; The Texas Co., and Gulf Oil Corp.

Negotiations with the Iranian Government were initiated in Teheran by this group in May, and the outlines of the final agreement announced August 4. The consortium was represented in the discussions by Howard Page, a director of Jersey Standard, and the Iranian delegation was led by Dr. Ali Amini, the finance minister. The full text of the agreement was made public September 20 after it had been submitted to the Majlis, or lower house of the Iranian parliament, for ratification.

Stipulations of Final Settlement

The final settlement gives the consortium most of the advantages of a standard concession agreement but provides that operations will be carried on in the name of National Iranian Oil Co., the government company which continues to hold title to the facilities. Two operating companies—one for exploration, development, and production, and one for refining—were incorporated in the Netherlands by the consortium with the Iranian Government appointing two of the seven members of the boards of directors of each. A holding company for consortium shares also was organized in Britain, as well as a procurement and service company.

The agreement provides that each of the consortium partners will organize their own trading companies in Iran to purchase and export the individual shares of the production at their own open posted price. N.I.O.C. was given a 12½ per cent royalty with the right to take this in kind and sell it in world market as a check against the trading companies' posted prices. In addition, the agreement calls for taxation by Iran against the trading companies to bring Iran's total participation in the industry up to the 50 per cent which is standard in the large oil-producing companies of the world. The two operating companies will handle producing and refining on a virtual cost basis.

Compensation for Anglo-Iranian is to come from a substantial payment to be made to it by the other participating companies. It has been reliably reported that the other partners will pay Anglo-Iranian a total of $600,000,000 for the 60 per cent of the consortium they hold. Of this, $120,000,000 is to be in cash and the remainder as a 10-cent per barrel oil payment. In addition to these sums, Anglo-Iranian, under terms of a separate agreement negotiated last summer, is to receive the equipment of $70,000,000 from the Iranian Government in payment for the small Kermanshah refinery and the nearby producing field (to be operated by N.I.O.C. to meet local requirements) and in payment for Anglo-Iranian's losses during the 3 years the dispute was pending.

IRAQ

Area, sq. miles	**116,600**	**Value**	**$2.82**
Population	**5,100,000**	**Refining cap., B/D**	**46,784**
Capital	**Baghdad**	**Production, B/D**	**625,000**
Currency	**Dinar**	**Producing fields**	**4**
Reserves, bbl.	**14,250,000,000**		

WHEN Iraq Petroleum Co., Ltd., signed its 50-50 profit-sharing agreement with the Iraq Government in 1951, it guaranteed a production of around 440,000 bbl. daily from the northern fields, including Kirkuk, in 1954, and 160,000 bbl. daily from southern Iraq in 1955. The expansion of the industry's facilities that has taken place in Iraq since that time is reflected in the fact that these production minimums have been exceeded for the last 2

IRAQ PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Number of wells: Pumping	Number of wells: Shut in	Number of wells: Midyear drilling	Prod. in bbl.: July dly. avg.	Prod. in bbl.: Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Kirkuk	1927	2,750	44		1		508,000	909,716,000	35.2	Middle Eocene ls.
Ain Zulah	1939	5,500	4		6		21,000	15,569,000	32.1	Cretaceous ls.
Zubair	1949	11,000	23		8	1	90,000	56,595,000	34.3	Cretaceous ss.
Butmah	1952	3,660	2				5,000	887,000	29.5	Cretaceous ls.
Rumaila	1953	11,000	1			3	(1)			Cretaceous ss.
Naft Khaneh	1923	3,000	2			1	12,000	48,000,000		Olig., Mio. ls.
Total Iraq			76		15	5	636,000	1,030,767,000		

1. Not yet on production.

IRAQ REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Barrels per stream day: Cat. cracking	Barrels per stream day: Thermal operations	—Special processing—
Iraq Petroleum Co., Ltd., 214 Oxford St., Oxford Circus, London W 1, England:				
Kirkuk	2,880			
K. 3 (Haditha)	6,450			
Government Oil Refineries Administration—Baghdad	24,000		16,640	
Khanaquin Oil Co., Ltd., Agent for the Government of Iraq:				
Khanaquin	10,240			
Muftieh Depot, Basrah	3,214			1V-300, 1A-100
Total Iraq	46,784		16,640	

(1) Planned.

years. Kirkuk alone has been averaging better than 500,000 bbl. daily.

The oil industry of Iraq is almost entirely in the hands of Iraq Petroleum Co., Ltd., and its associated companies. This famous international company traces its history back to the old Turkish Petroleum Co. which existed prior to World War I. Ninety-five per cent of I.P.C. is held in equal shares of 23.75 per cent each by four international groups: Anglo-Iranian Oil Co., Ltd.; Royal Dutch-Shell; Cie. Francaise des Petroles; and a joint company owned by Standard Oil Co. (N.J.) and Socony-Vacuum Oil Co., Inc. The remaining 5 per cent is held by C. S. Gulbenkian who figured in the original concession negotiations.

Iraq Petroleum itself holds the concession covering the provinces of Baghdad and Mosul east of the Tigris River. In this area is located the large Kirkuk field which was discovered in 1927 at a location some 550 miles from the seacoast. Mosul Petroleum Co., Ltd., a part of the I.P.C. group, holds the concession over the section of the country lying west of the Tigris and north of 33rd parallel of latitude. Basrah Petroleum Co., Ltd., another I.P.C. associated company, operates in southern Iraq, holding the concession over all of the country not covered by I.P.C. and Mosul Petroleum.

Producing Field Straddles Border

In the eastern part of the country is a small concession fronting on the Iraq-Iranian border. The area was held by Anglo-Iranian Oil Co., Ltd., as a part of its Iranian concession prior to a border adjustment which placed the territory in Iraq. The single producing field, Naft Khaneh, straddles the border between the two countries. The Iraq part of the field is operated by Khanaquin Oil Co., Ltd. (Anglo-Iranian) and is producing around 12,000 bbl. daily. Additional exploratory work is under way by the company. In 1951, the Alwand refinery and the Khanaquin oil terminal which serve Naft Khaneh field became the property of the Iraq Government under an agreement with Anglo-Iranian.

Iraq Petroleum's Kirkuk field is a narrow anticline more than 60 miles long and with three subsurface domes. It is connected to the Eastern Mediterranean by a system of long-distance pipelines extending across Syria and Lebanon. The largest of these lines is the 30 and 32-in. which was completed about 2 years ago. The original 12-in. was built in 1933 and 1934, and parallel 16-in. lines were laid after World War II. Originally, one branch of the system led to Haifa and the large Anglo-Iranian-Shell refinery in that city. This line has been inactive since 1948 because of the Arab-Israel war, and the company has recently been studying a request of the Iraq Government to rebuild the end of this extension north to an outlet in Lebanon.

Mosul Petroleum is a small producer, averaging about 25,000 bbl. daily from two fields, Ain Zalah and Butmah, northwest of Kirkuk toward the Turkish border. The crude is moved through a 135-mile, 12-in. line south into the main I.P.C. system at Station K-2 on the Tigris River.

Basrah Petroleum Co., Ltd., only field now producing is Zubair, located about 20 miles southwest of the city of Basra. This is the deepest producing field in the Middle East with a Cretaceous sandstone pay at about 11,000 ft. The crude is moved through two pipelines leading southeast to a tanker terminal at Fao on the Shatt-el-Arab River. The second of these lines is a 24-in. which was completed the latter part of 1953. The Fao terminal can accommodate three large tankers, and a fourth jetty is under construction.

About 20 miles west of Zubair, Basrah Petroleum found a new field in 1953 on the Roumaila structure. The production is obtained from formations similar to that in Zubair and at about the same depth. The area is under active development. Three rigs are in operation, and a separator station is under construction. Plans call for the commencement of commercial production the early part of 1955.

I.P.C. itself is continuing exploratory drilling on neighboring structures in the Kirkuk region. Last June, the company was unofficially reported to have made a major discovery on the Jambur fold about 25 miles southeast of Kirkuk. The well was reported to have produced around 17,000 bbl. daily of 41°-gravity oil. Earlier, another I.P.C. well, the Bai Hassan test, tested at a rate of around 10,000 bbl. daily.

Part of Iraq's requirements for petroleum products now come from the Khanaquin refinery, from a small topping plant at Basra, and from minor refining operations carried on by I.P.C. at Kirkuk. The country has a consumption estimated this year at slightly more than 17,000 bbl. daily. The increase in consumption over 1953 was about 1,500 bbl. daily.

A major refinery of 25,000 bbl. daily is now being built by the Iraq Government at Dora on the outskirts of Baghdad. The plant is being constructed under contract by M. W. Kellogg Co. and is due to come into operation the early part of 1955. The latter part of this year the government asked for bids for the construction of lubricating-oil manufacturing facilities at the refinery.

During the summer I.P.C. completed construction of a 132-mile, 12-in. crude line to Dora from Station K-2 on its pipeline system. The line was built on behalf of the government. Crude oil for the refinery will be supplied by the company under a clause in its 1951 contract which allows the government to buy crude at a token price of around 10 cents a barrel and with payment of pumping costs.

Iraq is receiving a large and growing revenue from the expanding oil activity in the country. In 1953, the government's total oil income amounted to the equivalent of about $144,000,000. Of this sum, 70 per cent is set aside for public development projects of the Iraq Development Board. These include flood control, irrigation, communications, schools, hospitals, and other improvements.

ISRAEL

Area, sq. miles	7,800	Currency	Pound
Population	1,400,000	Value	$1.00
Capital	Jerusalem	Refinery, cap., B/D	86,000

THE oil exploration which was touched off in Israel 2 years ago by the passage of a new petroleum law moved into the drilling stage this fall. Work over the next year or two is expected to show whether the country has the indigenous petroleum resources that leaders of the predominantly Jewish state hope for. Israel is relatively untested, and geological opinion on its prospects vary.

There are four main companies or groups interested in exploration in Israel. One is Pan-Israel Oil Co.-Mediterranean Petroleum Corp., representing the W. F. Buckley interests and identified with Pantepec Oil Co. Another is Lapidoth-Israel Petroleum Co. and its associates, Israel Oil Prospectors and Jordan Exploration Co., Ltd. A third is Israel-American Oil Corp. owned by Husky Oil Co. and the New York investment house, Bear-Sterns & Co. The fourth active company is Pontiac Petroleums, Ltd., which

is exploring acreage obtained by Israel Continental Oil Co. on a 50 per cent participation basis.

Each of these companies has moved in equipment and has undertaken, or is preparing to undertake, deep tests in various parts of the country. Lapidoth, using Kerr-McGee Oil Industries, Inc., as contractor, got under way first with a cable-tool hole at the southern end of the Dead Sea. More recently it began a well 6 miles south of Gaza. Pontiac's initial location was about 20 miles north of Tel Aviv.

Hostilities Suspend Drilling

Prior to the Lapidoth test, the only well drilled in what is now Israel was commenced by Iraq Petroleum Co., Ltd., organization near Gaza under a concession held under the old British mandate of Palestine. The well went to 3,464 ft. and was suspended when the Arab-Jewish hostilities prevented further work.

The Israel minister of finance, Levi Eshkol, early this fall estimated that about $5,000,000 and the equivalent of another $1,500,000 in Israeli currency had been spent on preliminary exploratory work in Israel to date. Licenses issued by the government under the 1952 petroleum law total more than 2,500,000 acres, or about 50 per cent of the total land area of the country. None of the major international oil companies has shown any interest in Israel since it opened up to exploration. This has been due partly to unfavorable geological views on the possibilities of production, also partly to the fact that these companies are heavily committed in the Arab states of the Middle East which are still technically at war with Israel.

The only refinery in Israel is the Haifa plant which is owned by a joint subsidiary of Anglo-Iranian Oil Co., Ltd., and Royal Dutch-Shell. The refinery was once a major source of products for export to Europe, but in 1948 the Iraq Government prohibited further movement of oil to the refinery through the I.P.C. pipeline from Kirkuk field. Since then the plant has been run at only about a quarter of its rated 86,000-bbl. daily capacity for meeting Israel's internal requirements.

KUWAIT

Area, sq. miles	1,950	Value	$0.212
Population	180,000	Refining cap., B/D	30,000
Capital	Kuwait	Production, B/D	942,000
Currency	Indian rupee	Producing fields	3
Reserves, bbl.		30,000,000,000	

ONE of the world's largest and richest oil fields is found in the small shaikhdom of Kuwait at the head of the Persian Gulf. Production from this single reservoir averaged slightly more than a million barrels daily last March. The shaikhdom's output is a close second to that in Saudi Arabia and in 1953 it ran ahead of the leading Middle East producing country.

The company which holds concession rights over all of Kuwait is Kuwait Oil Co., Ltd., which through subsidiaries is owned by Gulf Oil Corp. and Anglo-Iranian Oil Co., Ltd. The great productivity of Kuwait's Burgan field and its capacity for rapid expansion averted a possible serious gap in world oil supplies when Iranian production was suddenly lost through the nationalization in 1951. Anglo-Iranian, whose properties in Iran were seized, quickly called for maximum output from Kuwait.

Exploratory drilling, undertaken in the middle of 1951 by the Kuwait company for the first time since the original discovery in May 1938, has resulted in the discovery of two additional producing areas. One of these, Magwa, north of Burgan, has since been shown in stepout drilling to have an area of around 60,000 acres, almost as large as Burgan itself. To the east of Magwa is the Ahmadi Ridge area in which some five wells have been drilled. Ahmadi is known to be connected with Magwa, and indications are that Magwa is joined with the northern end of Burgan. Further extension drilling over the next few years is expected to reveal the full extent of this vast field.

Kuwait Oil Co. carried out geophysical work in the northern part of Kuwait last year and commenced its first drilling in this section the latter part of this year. The well

ISRAEL REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Consolidated Refineries, Ltd., Britannic House, Finsbury Circus, London E. C. 2, England—Haifa	84,000		43,000	A-1,000

KUWAIT PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Ahmadi Ridge	1952	3,500-4,800	5			2			31.9	Cretaceous sandstone
Burgan	1938	3,500-4,800	127		[1]5				31.9	Cretaceous sandstone
Magwa	1952	3,500-4,800	24		[2]2	1			31.9	Cretaceous sandstone
Total			156		7	3	[3]897,244	1,239,691,721		

1. Four observation wells and one awaiting completion of gathering facilities. 2. One observation well and one awaiting completion of gathering facilities. 3. Daily average for first 6 months of 1954.

KUWAIT REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Kuwait Oil Co., Ltd., 1 Gt. Cumberland Place, London W. 1, England—Mina-al-Ahmadi	30,000			A-210

LEBANON REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Iraq Petroleum Co., Ltd., Tripoli, Lebanon—Tripoli	[1]11,550			
Mediterranean Refining Co., Beirut, Lebanon—Sidon	6,250			R-1,120
Total Lebanon	17,800			

(1) 14,650 bbl. additional planned.

is at Raudhatain. In moving the rig to the location, the company set a new world's record for rig skidding. The equipment was moved in two units a total distance of 99 miles.

Oil-handling and shipping in Kuwait involve movement through relatively short lines to a large tanker jetty which is capable of berthing eight supertankers at one time. In addition, submarine lines provide loading space for five additional tankers. On shore, back of the jetty, the company operates a 30,000-bbl.-daily topping plant which provides products, including asphalt, for domestic requirements and bunkers for ships' fuel.

Unlike most of the other large fields of the Middle East which produce from limestone formations, Kuwait crude is found in three sand members of Cretaceous age. Thickness of the Middle Cretaceous at the crest of Burgan field is roughly 1,000 ft., and the lowest zone has a thickness of more than 500 ft. above the oil-water contact. The third and most productive zone has a crest thickness of about 300 ft. The company has drilled more than 160 wells in Kuwait since 1937, and only one of these, Bahrah, was dry. After this initial wildcat, the company drilled the Burgan discovery.

Kuwait is an independent shaikhdom under British protection. The concession has an interesting history. Gulf sought rights in Kuwait in the early '30's, but the ruler of Kuwait in the years prior to World War I had pledged that an oil concession would never be given except to "a person appointed from the British Government." This promise had been out of gratitude for British action in defending Kuwait's independence from threats by Turkey. As a result, Gulf was required to set up a British corporation and associate itself with Anglo-Iranian which at that time already had important production in Iran.

The concession was granted December 23, 1934, and the discovery was made nearly 4 years later. Nine wells had been drilled into the pay zone by July 1942 when it was necessary to close down the operation completely because of the war. The wells were reopened in June 1945, and the first oil loaded aboard a tanker a year later. Thus, in 8 years, Kuwait has skyrocketed to the position of the world's fifth largest oil-producing country.

Various observers of conditions in the Middle East consider that of all the countries of the Middle East, small and stable Kuwait makes the best use of its oil income. The government receives around $150,000,000 annually from oil production and is engaged in a large public-works program. The population of around 250,000 is offered a large variety of free services. A 1,200,000-gal. seawater-distillation plant is being built since there are no potable water supplies in the shaikhdom. The government has studied a water canal from the Shatt-el-Arab, but this requires an international agreement with Iraq. Health services are given at a token cost, and free schooling is provided. Sewers, streets, port facilities, electric lights, and other improvements are under construction.

NEUTRAL ZONE

Area, sq. miles	2,000	Production, B/D	18,700
Reserves, bbl.	429,000,000	Producing fields	1

THE Kuwait-Saudi Arabian Neutral Zone joined the list of the world's oil-producing countries the early part of 1954. The first commercial shipment of crude oil was made last January from a newly constructed terminal located on the Kuwait coast to the north. The latter part of this year output was at a rate of around 30,000 bbl. daily.

Two companies each hold an individual half interest in the Neutral Zone production. One is Pacific Western Oil Corp. which obtained a concession from the king of Saudi Arabia in 1949. The other is American Independent Oil Co. which is owned by a group of United States companies of which Phillips Petroleum Co. has the largest interest. American Independent, or Aminoil, acquired rights from the shaikh of Kuwait in 1948 for his half interest in the zone.

Wafra Discovery Followed Discouragement

The discovery of Wafra field in the western part of the territory was made in the spring of 1953 following 3 years of discouragement during which Aminoil, as operator for the two companies, drilled five dry holes and spent some $30,000,000. By the middle of this year, the field had 15 producers with the immediate development plan calling for a total of 20 wells on a half-mile spacing pattern. The wells produce about 1,500 bbl. daily each, a low output by Middle East standards. Gravity of the crude is around 24°, compared to 32°-36° elsewhere in the Middle East.

Aminoil is continuing exploration in the territory. Early this year it commenced its first wildcat test since the Wafra discovery. The well, South Fuwaris 1, was projected to be taken below the Burgan sands, but the operator ran into a tough fishing job and progress was delayed.

The facilities through which the first shipments of Wafra crude were made were constructed by Aminoil. These included separators, field tankage, pumping equipment, an 8 and 10-in. pipeline 34 miles in length, and a marine terminal providing tankage and a 16-in. submarine loading line extending about 9,500 ft. into the Persian Gulf to 48 ft. of water. The Aminoil terminal was named Mena Abdulla in honor of the present ruler of Kuwait.

Initially Pacific Western moved its share of the production into the export trade through the Aminoil-built facilities. However, this arrangement met objections from the Saudi Arabian Government whose concession contract with Pacific Western failed to give the company permission for pipelines outside the Neutral Zone. In this situation, Pacific Western undertook construction of its own pipeline and terminal. A line was laid from the field to a point off the northern coast of the zone. The terminal which was slated to be completed the latter part of this year was named Mena Saud after the present king of Saudi Arabia. Pacific Western's system provided a 10-in. pipeline and a 20-in. submarine line extending 9,000 to 10,000 ft. out from the shore.

QATAR

Area, sq. miles	5,000	Value	$0.212
Population, est.	25,000	Refining cap., B/D	600
Capital	Dohah	Production, B/D	97,900
Currency	Indian rupee	Producing fields	1
	Reserves, bbl.	1,500,000,000	

THE shaikhdom of Qatar, a barren and arid peninsula about 100 miles long and 80 miles wide, extends out into the Persian Gulf from Saudi Arabia. It has a single producing field now yielding nearly 100,000 bbl. daily. The operating company is Qatar Petroleum, Ltd. (formerly Petroleum Development (Qatar) Ltd.), which is a part of the Iraq Petroleum Co., Ltd. group. Qatar Petroleum's concession, first negotiated in 1935, gives the company exclusive rights on the land area and the territory waters.

Several years ago Superior Oil Co. obtained a concession on the offshore territory of Qatar, and a subsequent arbitration proceeding resulted in a ruling that I.P.C.'s

earlier concession included the entire country except the submerged areas beyond the limits of the territorial waters. Superior relinquished its concession 2 years ago, and the Royal Dutch-Shell organization acquired the rights formerly held by Superior. Shell's entrance in the Persian Gulf, as well as similar offshore concessions acquired by Anglo-Iranian Oil Co., Ltd., and Cie. Francaise des Petroles along the Trucial Coast to the east, was made possible by the abolition of the old Red Line agreement which formerly bound these I.P.C. partners to joint operations through much of the Middle East.

Shell has undertaken an active exploratory program in the more distant offshore Qatar waters. Marine gravity meter and seismograph work has been under way. The company anchored a 4,000-ton ship, Shell Quest, off the Qatar capital, Dola, to serve as a floating maintenance depot, and established shore installations in Dola itself.

SAUDI ARABIA

Area, sq. miles	870,000	Value	$0.2725
Population	6,500,000	Refining cap., B/D	189,000
Capital	Mecca and Riadh	Production, B/D	952,000
Currency	Riyal	Producing fields	11
Reserves, bbl.	36,000,000,000		

THE problems connected with the petroleum industry in Saudi Arabia are more in the field of politics and government relations than in the sphere of operations. There is certainly no dearth of available crude in the country. With the development of the great Ghawar field, Saudi Arabia has reserves in the 30-billion-barrels-plus range, second only to the United States. These are located fairly close to the coast, and the producing and shipping activities in general present no difficulties.

Saudi Arabia is the scene of the only completely American producing activity in the Middle East. Elsewhere, even in Bahreim where a Caltex affiliate holds the concession, Europeans, principally British, predominate because of soft-currency payroll considerations. The Saudi Arabian concession is held by Arabian American Oil Co. in which the share interests are held 30 per cent each by Standard Oil Co. of California, which made the original discovery in 1938, The Texas Co., and Standard Oil Co. (N.J.), and 10 per cent by Socony-Vacuum Oil Co., Inc. Out of approximately 25,000 employes, Aramco has more than 4,000 Americans. Saudi Arabians employed by the company number nearly 15,000.

At Dhahran, a short distance from the shore of the Persian Gulf in eastern Saudi Arabia, Aramco has built a completely integrated community with neat homes, hospitals, schools, shops, and other facilities. The area presents one of the world's most difficult climates, with summer temperatures up to 125° F. not uncommon. Other main Aramco centers in Saudi Arabia are at Abqaiq near the south end of the field of the same name, and at Ras Tanura where Aramco's large refinery is located.

In 1950, Aramco signed the first 50-50 profit-sharing agreement in the Middle East, a plan which has since spread to all the other producing countries. Further de-

NEUTRAL ZONE PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Wafra	1953	3,600-3,800	15			1	20,000	2,100,000	24	Middle Cretaceous sd.

QATAR PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Dukhan	1940	6,000	24		8	2	100,000	108,648,000	39	Jurassic limestone

QATAR REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Qatar Petroleum Co., Ltd., Umm Said, Qatar—Umm Said[1]	600			

(1) Planned.

SAUDI ARABIA PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Number Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Abqaiq	1941	6,800	43		[1]19	1	319,734	980,030,645	38	Jur., Clastic ls.
Abu Hadriya	1940	10,115						9,579	36	Jur., Clastic ls.
Dammam	1936	4,850	[2]28		2		61,296	308,130,144	35	Jur., Clastic ls.
Fadhili	1949	9,850							38	Jur., Clastic ls.
Ghawar-Ain Dar area	1948	7,125	39		5		395,670	372,912,833	35	Jur., Clastic ls.
Ghawar-Shedgum area	1952	7,125	9				28,692	5,193,161	35	Jur., Clastic ls.
Ghawar-Uthmaniyah area	1951	7,125	11			1	120,150	60,279,813	35	Jur., Clastic ls.
Ghawar-Huiya area	1953	6,800							34	Jur., Clastic ls.
Ghawar-Haradh area	1949	6,550				1			34	Jur., Clastic ls.
Qatif	1945	7,350	9				40,052	54,940,938	35	Jur., Clastic ls.
Safaniya	1951	5,560				1			27	Cretaceous sd.
Total Saudi Arabia			139		26	4	965,596	1,781,497,083		

1. Includes two gas-injection wells and one well being repaired. 2. Includes three producing gas wells.

SAUDI ARABIA REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Arabian American Oil Co., Dhahran—Ras Tanura	189,000		24,000	[1]R-12,500, P-1,000, A-500

(1) Scheduled for completion by middle of 1955.

mands have been made on the company by the government, and negotiations have been held intermittently for the last 2 years. One point involved is abolition of the discounted price at which Aramco's owning companies purchase Arabian crude oil. It amounts to around 34 cents a barrel. This feature of Middle East concession contracts is gradually being eliminated, to the financial advantage of the governments concerned.

New difficulties in relationships with the government arose early this year as a result of a contract with A. S. Onassis, a large Greek shipowner, negotiated with the Saudi Arabian Government. In a move to assure employment to his tanker tonnage, Onassis worked out a deal which was accepted by the Saudi Arabian Government. Under its terms a certain preference was granted to Onassis' vessels in the transportation of oil produced in Saudi Arabia. The contract set a standard of eligibility for other tankers to engage in the country's oil trade. This stipulated that only those tankers actively engaged in moving Saudi Arabian oil at the end of 1953 would be allowed to continue making shipments.

The Onassis agreement was vigorously protested. It was regarded as a violation of terms of Aramco's concession which gave that company rights to produce and take away the Saudi Arabian oil. The United States and other western governments with maritime interests denounced the arrangement as a flagrant instance of flag discrimination which could have serious effects on the freedom of international trade. Onassis set up a tanker company incorporated in Saudi Arabia and registered one vessel, a large new German-built tanker named after King Saud, under the Saudi Arabia flag. No move had been made by early fall to exercise the Onassis preference under the contract, and the outcome of the deal was in doubt.

Large Pressure-Maintenance Plant

During the early part of the year, Aramco placed in operation a large gas-repressuring plant to serve Abqaiq field. This area was the mainstay of Saudi Arabian production prior to the fuller development of the Ghawar area to the southwest. The facilities were designed to return some 150,000,000 cu. ft. of gas daily to the formation. Aside from Bahrain Petroleum Co.'s use of high-pressure gas from a deep zone for reinjection into its oil formation, the Aramco project is the first pressure-maintenance undertaking in the Middle East.

Aramco's principal drilling activity is in continuing the development of Ghawar. Additional separator plants have been built to handle crude from this field which is believed by many to be the world's largest oil accumulation. The company also has been using one rig in offshore work to develop Safaniya field which is the only production thus far found in the Persian Gulf. The area is not yet on commercial production.

Aramco's most interesting exploratory operation this year was in the drilling of the company's first wildcat test in the vast desert covering southeastern Saudi Arabia known as the Rub-al-Khali, or Empty Quarter. The well is about 200 miles south of Uthmaniyah. During the summer, it ran into a difficult fishing job after reaching 10,360 ft. Its drilling is a part of the company's program of steady work to evaluate the more remote sections of its concession.

Aramco ranks as the world's largest oil-producing company, and Saudi Arabia as the world's fourth oil country, behind the United States, Venezuela, and Russia. Last May, output hit a peak of 1,028,000 bbl. daily, highest achieved in the Middle East. The shutdown in Iran in 1951 reacted in favor of Saudi Arabia and increased the demand for its oil, though perhaps to a lesser degree than in Kuwait. With the Iranian dispute settled, the prospects are for a leveling off and possible reductions in the rate of production in Saudi Arabia as well as in other Middle East oil countries. Although it has been recognized that the benefit gained from the Iranian shutdown would be lost when operations were restarted, reductions in output in Saudi Arabia are likely to raise new problems with the government which is dependent on its oil income.

During the last several years, Aramco has carried out a major improvement and expansion program at the Ras Tanura refinery which is located on the shore of the Persian Gulf. During the summer, work was commenced on the latest project, a 12,500-bbl.-daily fluid Hydroformer for which Lummus Co., Ltd., has the engineering contract. Previously a new crude-topping unit was added, and more recently a catalytic polymerization unit and a naphtha caustic wash plant using the electrolytic regeneration process have been completed. The Ras Tanura refinery ranks as the largest in the Eastern Hemisphere, excluding the Abadan refinery. Runs at Ras Tanura have ranged up to 245,000 bbl. daily in a single month.

TERRITORIES OF SOUTHERN ARABIA

ADEN			
Area, sq. miles	75	Currency	Shilling
Population	82,000	Value	$0.1413
Refining capacity, B/D		120,000	
SULTANATE OF MUSCAT AND OMAN			
Area, sq. miles	82,000	Capital	Muscat
Population	550,000	Currency	Indian rupee
Value		$0.212	
YEMEN			
Area	75,000	Capital	Sana
Population	5,000,000	Currency	Riyal
Value		$0.2725	

THE shaikhdoms, protectorates, and other territories bordering the southern half of the Arabian Peninsula have been the scene of important petroleum developments in refining and exploration. Politically most of these small states are under treaty protection of the British Government, and are represented by the British in their current border difficulties with Saudi Arabia. These are mostly desert areas sparsely inhabited in the interior by wandering tribesmen, and before the discovery of oil in this part of the world, there was little incentive or need for exact location of the boundaries.

The largest single refinery project ever undertaken was carried out by Anglo-Iranian Oil Co., Ltd., in the crown colony of Aden at the southwestern corner of the Arabian Peninsula. The plant, rated at 120,000 bbl. per stream day, went into operation this summer, about 4 months ahead of the original schedule. The main construction con-

ADEN REFINING

Company and address—Refinery location—	Barrels per stream day			
	Crude distillation	Cat. cracking	Thermal operations	Special processing
Aden Petroleum Refinery, Ltd., Britannic House, Finsbury Circus, London, E. C. 2—Aden	120,000			R-12,000

tract was held jointly by Middle East Bechtel Corp. and George Wimpey & Co., Ltd. Work began on the plant in November 1952.

The new Aden refinery, which will serve the large Aden bunker trade as well as the company's export markets, was another, and a principal, step in the company's program of refinery expansion to replace the 500,000-bbl.-daily capacity lost when its properties in Iran were nationalized in 1951. The refinery includes two electronically controlled distillation unit, an Autofiner, and a 12,000-bbl.-daily Platformer. Adjacent to the refinery, the company has built a complete community to accommodate its personnel.

In the Red Sea kingdom of Yemen, the German operator, Carl Dielmann, carried out gravity-meter and geological work under a joint development contract signed in 1953 with the government. The contract is not a conventional oil concession agreement since the Yemen government and Deilmann share in both expenditures and profits in the ratio of 75-25 per cent respectively.

The joint Cities Service Co.-Richfield Oil Corp. in the Province of Dhofar of the Sultanate of Muscat and Oman has progressed rapidly to the drilling stage. The operators have a location about 125 miles north of Dalalah, the provincial capital, and were planning to begin drilling shortly after the first of the year. The area involved in this exploration was formerly a part of the Oman and Dhofar concesison of Iraq Petroleum Co., Ltd. The I.P.C. company relinquished Dhofar in June 1951.

On the Trucial Coast, two offshore exploration programs are in a preliminary stage of activity. Rights on the land territory of these shaikhdoms and in their territorial waters are held by the Iraq Petroleum Co., Ltd., organization under older concessions. Off the shaikhdom of Dubai, beyond territorial waters in the Persian Gulf, a program is being carried out on behalf of the joint concession holders, D'Arcy Exploration Co., Ltd. (Anglo-Iranian) and the French oil company, Cie. Francaise des Petroles. Dubai Marine Areas, Ltd., has been organized to hold this concession. The same offshore territory of the neighboring shaikhdom of Abu Dhabi is being explored by D'Arcy which holds this concesison without partners.

TURKEY

Area, sq. miles	296,503	Value	$0.3575
Population	20,902,628	Refining cap., B/D	7,200
Capital	Ankara	Production, B/D	1,100
Currency	Pound	Producing fields	2
Reserves, bbl.		65,000,000	

A HALF dozen foreign companies ready to undertake exploration in Turkey have been waiting during most of the past year for the government to draft detailed regulations implementing the new petroleum law passed by the parliament early last March. Meanwhile, the government continued work on a modern refinery to utilize production from the two existing fields, and established a new state company to operate existing government oil properties.

Since the early 30's petroleum activities in Turkey, except marketing, have been carried on by a state entity, the M.T.A. Institute, which discovered Ramandag and Garzanfields in the southeastern part of the country. About 3 years ago the government showed its dissatisfaction with the results of state exploration by reversing its oil policy in favor of private foreign capital.

The new law offers a satisfactory basis for foreign-company operations. The country is divided into nine areas. Two of them in the northeastern section of the country and including all territory bordering on the Soviet Union and Iran, are closed. Other provisions of the law call for a 27½ per cent depletion allowance, a 50-50 split of profits once the original investment is recovered, and a 40-year exploitation term.

U. S. Experts Aided in Drafting Law

The law was drafted with the assistance of Max Ball, Washington petroleum consultant. Ball was working on the regulations at the time of his death during the summer. The work was continued by Elmer E. Batzell, an attorney who had been associated with Ball.

Five foreign companies indicated their intention of taking out concessions when the filing period is opened after promulgation of the regulations. These companies were: Standard Oil Co. (N.J.); Socony-Vacuum Oil Co., Inc.; Royal Dutch-Shell; America Overseas Petroleum, Ltd. (Caltex); and Kern Oil Co., Ltd., a British firm with interests in California and Trinidad.

The government was to decide all duplicating acreage filings on the basis of four considerations: (1) capital available, (2) national interest, (3) technical ability, and (4) previous experience. Government oil officials gave assurances that the new national Turkish oil company would have to compete for additional acreage with private applicants on this same basis.

Under the reorganization of the government's interest in oil, the new company, the Petroleum Corp. of Turkey, majority owned by the government, was to take over Ramandag and Garzan as well as other M.T.A. properties. These two fields in southeastern Turkey have reserves calculated at between 65,000,000 and 70,000,000 bbl. of heavy crude.

The new Turkish Government refinery being built by Ralph M. Parsons Co. is at Batman which is connected to the producing areas by a 25-mile pipeline. The refinery will have a capacity to process 6,250 bbl. daily and will cost approximately $10,000,000.

TURKEY PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Garzan	1950	4,530			3	1			26.7	Cretaceous limestone
Raman	1940	4,500		5	9	1	700	805,000	20.5	Cretaceous limestone
Total Turkey				5	12	2	700	805,000		

TURKEY REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
M.T.A. Institute, Ankara—Batman	[1]7,200	[2]		[3]A-135, [4]V-2,348

(1) 6,950 bbl. of total to be added. (2) 3,010-bbl. Thermofor unit to be added. (3) Asphalt capacity to be increased by 1,417 bbl. (4) To be added.

Europe

AUSTRIA

Area, sq. miles	32,369	Value	$0.0390
Population	6,611,307	Refining Cap., B/D	30,000
Capital	Vienna	Production, B/D	62,000
Currency	Schilling	Reserves, bbl.	300,000,000

AUSTRIA'S producing fields and refineries are situated in the Russian-occupation zone and hence fall behind the iron curtain. They were seized by the Russians in 1945 and have been under Russian control since. Austria's crude production has been built up to about 62,000 bbl. daily, and the value of these properties apparently is one of the main reasons the Russians have consistently balked all efforts to conclude an Austrian treaty which would end the occupation.

Austria's oil production has never benefited either Austria or the owners of the property as it could have. From 1932 to 1953, it has been estimated that approximately 130,000,000 bbl. of crude oil was produced in the country. Of this, some 87,500,000 bbl. was during the Russian occupation. Most of the other 42,500,000 bbl. was produced during the war when the country was under Nazi German rule. Austrian petroleum authorities now believe that the country has reached its peak production from presently discovered areas and that a decline will shortly set in.

This view seems supported by the known facts about the Russian operations. The middle of 1953, the Soviet Mineral Oil Administration brought its exploratory work to a halt. Activities since then have been largely confined to existing fields which it appears are being drained without regard to ultimate recovery. The Russians were able to obtain a major increase in Austrian production by discovery and development of the fields of Matzen-Prottes, Aderklaa, and Blockfliess northeast of Vienna in the 3,000-sq. mile Vienna basin. However, 27 Russian exploratory wells in the southern part of the basin field.

Beginning in 1951, the Soviet Mineral Oil Administration began releasing sufficient products from the Austrian refineries it controlled to meet domestic needs for products. Imports now largely consist of specialties. Early this year, the satellite Russian government in Romania offered to supply petroleum products to Austria in negotiations for a trade agreement. The price which the Russians specified for motor fuel was about 30 per cent below that charged by Russia for oil from Austria's own fields. Fuel oil was offered by Romania at about half the Russian price, and gas oil also was cheaper.

The Russians claim they are entitled to the Austrian oil properties under terms of the Potsdam agreement giving it former German assets in its territory. However, the Allies have consistently told Russia that many of these assets were earlier acquired by force by Germany from former Austrian and foreign owners. The Russians, apparently because of political reasons and a reluctance to take their troops out of the country, refused to agree to the 1949 draft Austrian treaty. The provisions of this, insofar as the petroleum industry was concerned, gave Russia 60 per cent of the production for 30 years with other refining and exploration concessions.

There are seven refineries in Austria, all in the Soviet Zone and processing the domestically produced crude. These plants have a total throughput estimated at about 38,000 bbl. daily. Five refineries are operated by the Soviet Mineral Oil Administration. This capacity under direct Russian control makes up around 30,000 bbl. daily of the total. The other two refineries are the Vacuum (Socony-Vacuum Oil Co., Inc.) plant at Kagran and the Shell plant at Floridsdorf. Operations of these refineries are closely regulated by the Soviets. Of the five refineries under direct Russian control, about 7,200 bbl. daily is at Schwechat, 6,600 bbl. daily at Korneuburg, 6,600 bbl. daily at Lobau, 5,800 bbl. daily at Moosbierbaum, and 4,000 bbl. daily at Voesendorf.

BELGIUM

Area, sq. miles	11,775	Currency	Franc
Population	8,678,000	Value	$0.0198
Capital	Brussels	Refining cap., B/D	100,100

BELGIUM'S importance to the petroleum industry lies in the size of its refining industry and in the large and growing market it offers for petroleum products. The country is the home of eight separate refineries ranging from small topping plants on up to large-capacity complete refineries. Current consumption in Belgium is about 75,000 bbl. daily, an estimated 10 per cent gain over a year ago.

The largest refinery in Belgium is the 40,000-bbl.-daily plant of Soc. Industrielle des Petroles at Antwerp. This refinery, which was completed in 1951, is owned jointly by Anglo-Iranian Oil Co., Ltd., and the Belgian company, Cie. Financiere Belge des Petroles, S.A. (Petrofina). Latest of a series of additions made at the refinery are a 10,000-bbl. daily catalytic cracking unit and a catalytic polymerization plant due to be completed the early part of next year.

Near the SIBP refinery, which is located on the right bank of the Scheldt River about 4 miles downstream from Antwerp, is the 25,000-bbl.-daily refinery of Esso Standard Refinery, S.A. which was brought on stream in November 1953. Except for these two refineries and the 1,900-bbl.-daily plant of Belgian Shell which processes topped crude at Ghent, all the other refineries in the country represent Belgian interests.

One of these, the refinery of Albatros S. A. Belge pour la Raffinage de Petrole, is nearing completion of an expansion and modernization program which includes construction of a 3,600-bbl.-daily Houdriflow catalytic cracking unit, new crude unit, feed preparation, gas recovery and stabilization, a 500-bbl.-daily polymerization unit, and new treating facilities. Crude capacity, now about 12,000 bbl. daily, is ultimately to be extended to 15,000 bbl. daily.

The latter part of this year it was announced that Soc. Chimique des Derives du Petrole, S.A., would erect a plant for producing ethylene and propylene from gas residues from three of the Antwerp refineries. The plant is due to commence operations in about 3 years.

Among other projects under way or planned in Belgium is one for the construction of a 900-bbl.-daily Platformer. This unit will be built by Soc. Raffineries et Distilleries Anversoises, "Radian," at its refinery at Anvers-Kiel.

EUROPE

Biggest field in western Europe shapes up from Jersey Standard's Parentis discovery in southwestern France . . . Estimates of size revised downward, but field still ranks as major find . . . Discovery gives shot in the arm to exploratory work throughout France . . . Paris basin search encouraged by minor discovery . . . Gulf starts commercial production at good heavy-oil field at Ragusa, Sicily . . . Political outlook improves as government grants exploitation concession . . . Outlook for private, foreign companies in Italy itself is better with signs of dissatisfaction over costs of government operations . . . Eventual opening up of this territory is possible . . . West Germany makes steady and significant progress . . . Discoveries in Bavaria and development along the Upper Rhine widen the republic's prospects . . . Production, already highest in western Europe, still on the rise . . . Refining capacity in western Europe levels off at about 2,400,000 bbl. daily . . .

FRANCE

Area, sq. miles	212,659	Value	$0.0029
Population	42,239,000	Refining cap., B/D	491,100
Capital	Paris	Production, B/D	10,800
Currency	Franc	Producing fields	5
Reserves, bbl.		100,000,000	

FROM the standpoint of the petroleum industry, the outstanding single event during the past year in France —and possibly in all of Western Europe—was the discovery of a major oil field in southwestern France on the Landes coast between Bordeaux and Bayonne. Officials of Esso Standard, S.A.F., which made the discovery, have predicted a production of 30,000 bbl. daily in about a year's time. This output would be twice that of Western Europe's present largest producing field, Schoonebeek in the Netherlands.

The French discovery near the village of Parentis-en-Born near the Bay of Biscarosse penetrated a Cretaceous limestone pay horizon between 7,382 and 7,428 ft. in March of this year. In this interval, the well tested 1,100 bbl. daily on a ¼-in. choke, and 3,370 bbl. daily on a ½-in. choke. The hole was still in the limestone when it was bottomed at 7,868 ft.

The second well on the structure was drilled about

BELGIUM REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	—Special processing—
Albatros, S.A., Belge Pour le Raffinage de Petrole, 10 Petroleumkaai, Antwerp-Kiel—Antwerp	12,000	4,000		Poly-500
Belgian Shell Co., S.A., 47 Cantersteen, Brussels—Ghent	3,000			
Cie. Industrielle "Atlas," S.A., 101 Ave. de France, Antwerp—Hoboken	2,100			
Esso Standard Refinery, S. A., Petroleumdok, Oostaai, Antwerp—Antwerp	27,000	10,000	4,000	
Raffinerie Belge de Petroles, S.A., 115 Ave. de France, Antwerp—Antwerp	12,500		4,200	
Raffineries et Distilleries Anversoises 10, Place Leopold, Antwerp—Anvers—Kiel[1]	3,500			V-4,000
Ste. Industrielle Belge des Petroles, Boite Postale No. 55, Antwerp—Kruisschans[2]	40,000		19,200	
Total Belgium	100,100	14,000	27,400	

(1) Platformer of 900-bbl. capacity planned for 1955. (2) 20,000-bbl. distillation unit to be on stream in early 1955. 19,000-bbl. vacuum-distillation unit set for completion in early 1955. Fluid catalytic unit of 10,000-bbl. capacity to be ready in early 1955. 3,000-bbl. catalytic polymerization unit scheduled to be finished in early 1955.

FRENCH PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data on prod. formation
Gallician (Languedoc basin)	1951	6,000-7,000	1	1	5		10	19,000		Oligocene sd.
Lacq (Aquitaine basin)	1949	2,100-2,400	15	6	9	2	6,040	6,590,000	22	Cretaceous l.
Parentis (Aquitaine basin)	1954	7,300-7,400	1			2	4,100	65,500		Cretaceous dol.
Pechelbronn (Alsace basin)	1813	600-4,000	4	461	98	2	800	21,150,000	32	Olig. dol., Jur., Tri.
Staffelfelden (Alsace basin)	1952	6,000-7,000	4	2			620	234,300		Jurassic l.
Total France			25	470	112	6	11,570	28,058,800		

FRANCE REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	—Special processing—
Cie. Francaise de Raffinage, 11 Rue Dr. Lanceraux, Paris 8:				
Gonfreville	64,800		17,400	
La Mede	56,000	10,000	10,000	
Cie. Raffinage Shell-Berre, Rue de Berre, Paris 8:				
Berre l'Etang	70,000	8,000	9,000	
Pauillac	12,000			
Petit Couronne	50,000		8,500	
Esso Standard, S.A. Francaise, 82 Ave. des Champs Elysees, Paris 8—Port Jerome	44,800	10,000	6,150	
Pechelbronn, S.A., d'Explorations Minieries, 4 Rue Leon Jost, Paris 17—Merkwiller	4,200			
Raffineries Francaise des Petroles, de l'Atlantique Donges-St. Nazaire—Donges	35,000	7,500	3,600	
Ste. des Raffineries de Petrole de la Gironde, 7 Palace Vendome, Paris—Ambes	16,500	[1]4,600	3,600	[1]V-6,300, [1]P-540
Ste. Generale des Huiles de Petrole 21, Rue de la Bienfaisance, Paris 8, France:				
Dunkirk	45,000		6,800	L-1,100, V-9,000, A-1,300
Lavera	50,000		5,000	[2]6,000
Socony-Vacuum Francaise, 46 Rue de Courcelles, Paris 8:				
N.D. de Gravenchon	17,300		3,140	
Frontignan	25,500	9,000	3,380	
Total France	491,100	49,100	76,570	

(1) To be completed in 1956. (2) To go on stream in early 1955.

4,000 ft. to the southwest of the discovery. It found the section more than 1,000 ft. low and barren. The second confirmatory well, Parentis 3, however, established a gross thickness of pay of around 1,100 ft. at a location about 4,000 ft. to the west of the discovery. Together, the first two productive wells on the structure had a potential of more than 5,000 bbl. daily, almost as great as the entire crude production in metropolitan France prior to the discovery.

The Esso company is owned 63.2 per cent by Standard Oil Co. (N.J.) and 18.35 per cent by Gulf Oil Corp. The remaining stock, some of which is traded in Paris, skyrocketed from around $27 to $160 a share following the discovery. The concession on which the discovery was made was granted by the French Government in February 1952 and covers 4,300,000 acres centered roughly on Bordeaux. Terms of the concession provided that when production was found a producing company would be formed in which the French Government would hold 10 per cent interest.

Discovery Made by Private Foreign Company

It was somewhat ironic that this highly significant oil discovery should be made by a private foreign company. At the end of the war, France, recognizing the strategic and economic importance of a domestic oil supply, embarked on a large-scale exploratory program through metropolitan France and in the overseas territories of the French Union. The total expenditure on this program through 1956 will be around $460,000,000. The work has been carried out by an organization of companies in which the French Government holds large or controlling interest.

Results of the French exploration have been meager. In southwestern France, south of the Parentis area, a single field was developed at Lacq by the French company, Soc. Nationale des Petroles d'Aquitaine. Output is about 6,000 bbl. daily, and a deep gas zone has been found. The gas contains 17 per cent of hydrogen sulfide, and the possibility of sulfur production has been under study. Besides Lacq, the French effort resulted in increasing the production of the small fields in Algeria and French Morocco.

French Government policy has discouraged participation by foreign companies in exploration on French soil. Terms for concessions, particularly those calling for a heavy if not a majority French interest, are unacceptable to most oil companies. The only company other than Esso Standard to negotiate a French concession is the Caltex-affiliated American Overseas Petroleum, Ltd. During the summer American Overseas went into partnership with the French company, Soc. Nationale des Petroles du Languedoc Mediterranean (66 per cent French Government) and obtained rights over some 7,800 sq. miles in the Paris basin of Central France. The arrangement gave Caltex a 55 per cent participation in the exploratory stage but reduced this to 45 per cent on the grant of an exploitation concession following any discovery of commercial production.

The so-far little explored Paris basin took on new interest during the year. The wholly government-owned company, Regie Autonome des Petroles, drilled a well on the Bray anticline near the city of Beauvais, which was reported to have obtained about 25 bbl. daily from shallow formations. This company, R.A.P., operates the St. Marcet gas field in southwestern France from which fuel is supplied to various population centers in the Garonne Valley.

The Esso Standard discovery is certain to encourage an ever intensive exploration in metropolitan France, particularly elsewhere in the Bordeaux basin. The Esso company got under way with two additional wildcats the latter part of the year. The Parentis crude, which was being shipped by rail tank car to the Port Jerome refinery, is about 32° gravity and of low sulfur content. Despite the fact that the discovery was made by a foreign company, there was little evidence to support any belief it would cause the government to modify its somewhat restrictive policy as regards foreign participation.

Refining Expansion

In refining, the postwar buildup of capacity was completed in France a year or two ago, and work since has largely been in construction of facilities to improve and upgrade production. Virtually all the refineries in France are owned by subsidiaries of large international oil companies. Among the companies represented are Standard Oil Co. (N.J.); Royal Dutch-Shell; Socony-Vacuum Oil Co., Inc.; Caltex (through Ste. des Raffineries de Petrole de la Gironde); and Anglo-Iranian Oil Co., Ltd., through Ste. Generale des Huiles de Petrole (SGHP). Cie. Francaise de Raffinage is an affiliate of Cie. Francaise des Petroles which holds the French 23.75 per cent share of Iraq Petroleum Co., Ltd. The Pechelbronn and l'Atlantique companies are owned by French interests.

Among the refinery improvements completed over the last year were new catalytic cracking units at C.F.R.'s La Mede plant and at Shell's Berre refinery. A new cracking unit was finished at the Donges refinery, and at Berre, a sulfur-recovery unit was brought into operation. SGHP's L'Avera refinery built a Platforming unit, and work was under way on an atmospheric distillation unit at the Pechelbronn refinery to increase capacity to about 4,200 bbl. daily. Additional tankage has been erected at most of the French refineries over the last year.

This year a petroleum products pipeline was brought into operation between the port of Havre and Paris. The operating company is Soc. des Transports Petroliers par Pipe-Line (TRAPIL). Capacity of the line is about 30,000 bbl. daily. Refining and marketing companies in the Havre-Paris area have an interest in the line.

ITALY

Area, sq. miles	116,228	Value	$0.0016
Population	46,598,000	Refining cap., B/D	453,750
Capital	Rome	Production, B/D	1,400
Currency	Lira	Producing fields	6
Reserves, bbl.		90,000,000	

PRODUCING activities in Italy, aside from Sicily, are centered largely on natural gas. Most of the gas comes from fields in the Po Valley of northern Italy which is by law reserved to the government agency, Ente Nazionale Idrocarburi (ENI) and its subsidiaries such as Azienda Generale Italiana Petroli. Private companies, most of them Italian, are participating in exploration elsewhere in Italy together with AGIP. Sicily presents a different picture. Under a separate petroleum law, the Sicilian Government encourages foreign private capital. Sicily's first commercial oil discovery was made early in 1954 by a Gulf Oil Corp. subsidiary.

The larger units of the Italian refining industry are mostly owned by Italian affiliates of the large international oil companies. Companies with refining interests in Italy include Standard Oil Co. (N.J.), which shares ownership of Stanic Industria Petrolifera, S.p.A., with the Italian Government company, Azienda Nazionale Idrogenazione Combustilibi (ANIC); Royal Dutch-Shell, through Soc. per

l'Industria Italiana del Petroleo; Anglo-Iranian Oil Co., Ltd., with its 50-50 per cent partnership with AGIP in Industria Raffinazione Olii Minerali; Socony-Vacuum Oil Co., Inc., which operates the large, partially export refinery at Naples; and Caltex through Soc. Azioni Raffinerie Padana Olii Minerali which it owns jointly with the Fiat organization; and Petrofina, which this year acquired the independent Italian refining company, Permolio.

In addition to those plants owned by the large international companies, the Italian refining industry also includes a large number of generally smaller refineries owned by predominantly Italian interests. These plants range down in size to local topping plants of a few hundred barrels daily capacity. The existence of the numerous smaller Italian refineries differentiates the organization of the industry in Italy from that in France or England where processing operations are almost entirely in the hands of the large oil companies.

The most serious problem of the Italian refining industry is overexpansion of basic crude capacity. Italian refineries are capable of running some 400,000 bbl. daily of crude oil. Consumption in the country, at present about 160,000 bbl. daily, is less than half this refining capacity. The latter part of this year there were about 38 separate

ITALY (INCLUDING SICILY) PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Number of wells: Pumping	Number of wells: Shut in	Number of wells: Midyear drilling	Prod. in bbl.: July dly. avg.	Prod. in bbl.: Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Cortemaggiore	1949	6,230	20		9		1,459	1,464,270	35	Middle Miocene ss.
Ripi (Frosinone)[1]										
S. Giorgio (Ptacenza)[1]										
Tocco Casauria (Pescara)[1]										
Tramutola (Potenza)[1]										
Ragusa (Sicily)[1]	1953	6,000			[2]3				12-16	
Total Italy			20		12		1,459	[3]3,176,262		

1. These figures from Azienda Generale Petroli Italiana (A.G.I.P.), the state operating company, show all of Italy's production in Cortemaggiore field. The other fields are listed by A.G.I.P. as oil fields, but apparently do not have any production. 2. Wells in Sicily are not producing commercially at midyear. 3. This total includes production from other fields which are now shut in and no longer reported.

ITALY

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	—Special processing—
A.G.I.P. Minearia S.P.A., Via Fratelli Gabba 1, Milan—Cortemaggiore	(1)			
Anonima Petroli Italian, Falconara—Falconara	13,500		3,000	V-3,500
"Aquila" Societa Technico-Industriale, Via Dante 5, Trieste—Aquila, Trieste	15,000		3,500	
"Condor" S.p.A. per l'Industria Petrolifera e Chemica, Milan—Milan	45,000	15,000		
Delle Paine, Genoa—Genoa	1,000			
Distilleria Italiana Catrami, Affini, Carrara—Carrara	3,000		500	
Esso Standard Italiana, S.p.A., Via Assarotti 40, Genoa—San Sabba, Trieste	6,150		3,000	
Galetti, Florence—Florence	3,700		750	
Garrone, Genoa—Genoa	4,100		1,900	
Industria Raffinazione Oli Minerali, Via Barbarini 67, Rome 15—Venice	35,000		9,750	[2]2,000, L-1,000, A-250
Industrie Chimiche Italian del Petroleo, Mantova—Mantova	10,000	4,000		
I.L.S.E.A., Como—Como	2,400		250	
I.P.L.O.M., Genoa—Genoa	1,000			
Lombarda Petroli, Milan—Milan	5,000		2,500	
Nazionale Industria Oli, Lubrificanti, Milan——Milan	1,500		500	
Purfina Italiana S.p.A., Corso Matteotti 10, Milan:				
Florence	3,500		600	
Geneva	11,000	1,500		A-1,100
Milan	[3]3,000			500, L-350, A-1,050
Rome	10,000	1,500		500, A-1,250
Petroli d'Italia, Fiorenzuolla, d'Ardia, Emilia—Piacenza	6,000		2,500	
Raffinerie Sicilane Oli Minerali, Rasiom, Augusta, Sicily—Augusta, Sicily	44,000	[4]10,000	8,200	2,500, [4]Poly-1,000 [4]6,000, A-1,500
Raffineria Oli Lubricanti, Viguzzolo, Alexandra—Viguzzolo	2,000			
San Quirico, Genoa—Genoa	2,500			
S.A.R.O.M., Ravenna—Ravenna	13,500		2,400	
S.I.R.O.M., Milan—Milan	1,500			
Sta. per Azioni Raffineria Padana Olii Minerali, Piazza San Carlo 161, Turin—Novara	13,300	[5]2,880	3,150	[5]V-5,150, [5]Poly-315
Sta. per l'Industria Italiana del Petrolio, Genoa—La Spezia	32,000		2,800	[6]9,000
Sta. Petrolifera Italiana, Farnovo Taro (Parma)—Farnovo Taro	2,500			
Socony-Vacuum Italiana Casella Postale 1492, Geneva, Italy—Naples	72,000	[7]22,000	2,700	L-400, A-300, [7]Poly-900
Stanic Industria Petrolifera, Rome:				
Bari	45,000		4,500	V-4,000, L-1,200, [8]A-25,000
Leghorn	41,500	3,700	[8]8,900	[8]A-6,200
S.T.O.I., Via Pietro Fanfani, 129 Firenze—Castello/Firenze	2,000		1,000	1,000
Dott G. Volpato & Co., S.p.A., Via Lodovico il Moro N. 47, Milan—Milan	2,100			
Total Italy	453,750	22,000	57,200	

(1) 3,000-bbl. refinery being built with 2,250-bbl. cat. cracker. (2) Planned. (3) 4,000 additional being built. (4) Planned. (5) Scheduled for 1955. (6) Planned for 1955. (7) Planned for 1955. (8) Being constructed.

refineries operating in Italy, including some 25 with a capacity of less than 10,000 bbl. daily. Italian refining capacity has increased more than 10 times since prewar.

The closing of the Haifa refinery in Israel and the subsequent shortage of refining capacity resulting from the shutdown of the Abadan refinery in Iran for several years had the effect of alleviating the overcapacity in Italy. Now, however, the emphasis is on the development of adidtional markets, either in Italy or abroad. The system used by the Italian Government allows refineries to sell on the domestic market the equivalent of a percentage of a plant's capacity. This arrangement in itself, along with the government's virtually unrestricted granting of refining licenses, encouraged construction of the additional capacity which now plagues the Italian industry.

A number of the larger Italian refineries have been adding secondary processing facilities in order to upgrade their output. A fluid Hydroformer is being added at the Leghorn refinery of the Stanic company; fluid catalytic cracking units are under construction or planned at the Milan refinery of SARPOM and at the Augusta, Sicily, refinery of Raffinerie Siciliane Olii Minerali (RASIOM). The IROM company this year completed a major modernization and improvement program at its Porto Marghera refinery near Venice.

Plan Would Encourage Private Operation

There has been some discussion in Italian government circles of the need for amending the old 1926 mining law under which exploration and development outside the reserved Po Valley is carried out. The plan is to provide encouragement for private company operations. Although it is considered that AGIP's work in the Po Valley has been reasonably successful, especially in the development of natural-gas supplies, some members of parliament feel that Italy's economy should not be further drained by heavy government investment in petroleum operations.

The network of natural-gas pipelines, which extend into most of the large cities of the industrialized northern part of Italy, is the largest in Europe. Around 90 per cent of the total gas production is by ENI or its subsidiaries, and the pipeline operation is handled by another state-owned company, Soc. Nationale Metanodetti. Natural-gas production in Italy was expected to reach 2,900,000,000 cu. m., or about 280,000,000 cu. ft. daily, this year. This would be equivalent to nearly 60,000 bbl. daily of fuel oil and would represent an increase of more than 26 per cent over the production in 1953.

The two main foreign companies interested in exploration in Sicily are Gulf and Anglo-Iranian Oil Co., Ltd., each of which holds extensive acreage blocks through subsidiaries. Gulf owns entirely the American International Fuel & Petroleum Co. and has a 65 per cent interest in Mediterranean Oil Co. with the remaining 35 per cent held by Macmillan Petroleum Co. Macmillan also has acreage in Sicily in its own right. Anglo-Iranian operates in Sicily through D'Arcy Exploration Co., Ltd.

The Gulf discovery was made on American International Fuel & Petroleum acreage at the edge of the town of Ragusa in the southeastern part of the island early this year. The crude is around 20° gravity and comes from formations topped at about 6,200 ft. By the early fall, Gulf had three wells in the field each of which were reported good for 500-600 bbl. daily of the heavy crude on pump. Gulf also has undertaken a wildcat test on Mediterranean Oil acreage to the west near the town of Aragona.

About 28 miles west of Ragusa, D'Arcy Exploration this summer obtained extremely heavy crude (about 5° gravity) in its first well drilled in Sicily. The location is near the town of Vittorio. The company was making further tests and studies to determine if it would be possible to produce the oil. In addition to these two finds, a subsidiary of the government-owned AGIP is reported to be developing a gas discovery at the south edge of Catania in Sicily.

NETHERLANDS

Area, sq. miles	15,450	Value	$0.2643
Population	10,316,739	Refining cap., B/D	237,000
Capital	Amsterdam	Production, B/D	17,800
Currency	Guilder	Producing fields	3
Reserves, bbl.	90,000,000		

FURTHER expansion and improvement work is being carried out at the two large refineries situated in the Netherlands. A second catalytic cracking unit is being built at the Pernis refinery of N. V. de Bataafsche Petroleum Mij. (Royal Dutch-Shell), and a small increase is being made in crude capacity at the nearby Caltex refinery.

Results of intensive exploration in the Netherlands since the end of the war have been somewhat disappointing. The single large field, Schoonebeek, was discovered during the war and its present output of around 18,000 bbl. daily is the largest from a single field in Western Europe.

However, nothing to compare in size with Schoonebeek has been found in the postwar program. Several small gas fields have been discovered, and a system of pipelines to move the fuel to nearby industries has been built by the government.

The exploratory work has been carried out by N. V.

NETHERLANDS PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Delft	1954	4,000	1			1	49	12,715	32.2	L. Cretaceous ss.
Rijswijk	1953	5,100	3			1	206	50,046	31.5	L. Cretaceous ss.
Schoonebeek	1943	2,500		244		1	17,811	33,341,951	25.2	L. Cretaceous ss.
Total Netherlands			4	244		3	18,066	33,404,712		

NETHERLANDS REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	—Special processing—
Caltex Petroleum Maatschappij (Nederland), N.V., The Hague—Pernis	37,000		16,500	P-950
N.V. de Bataafsche Petroleum, Mij., The Hague—Pernis	200,000	33,000	29,200	
Total Netherlands	237,000	33,000	45,700	

(1) Includes 2,000 bbl. to be completed in 1955.

Nederlandse Aardolie Mij., jointly owned by Royal Dutch-Shell through B.P.M. and Standard Oil Co. (N.J.). Expenditures so far in the program amount to about $18,000,000. The only commercial oil discovery was in 1953 at a location on the outskirts of The Hague. This small field, Rijswijk, has a production of around 150 bbl. daily from formations at about 5,100 ft. The gravity of the crude is somewhat higher than Schoonebeek, 31.4° at Rijswijk as against 25.1° at Schoonebeek. About 4 miles from Rijswijk is another small area, Delft, where production also has been obtained. Further drilling is being carried out in this area.

N.A.M. the latter part of this year had two wildcats under way in the eastern part of the country in the general vicinity of Schoonebeek. Drilling so far in the exploratory program in the Netherlands indicates the principal remaining prospective area is in the southwestern part of the country between Rotterdam and the Belgium border. There is a possibility, however, that this region, like the Rijswijk-Delft area, also will be badly cut up by faulting.

Some of the small Dutch gas fields extend across the German-Netherlands border, and on the German side are produced by German companies. The middle of this year, N.A.M. reached agreement with three German companies, C. Deilmann Bergbau, Gewerkschaft Elwerath, and Preussag, under which withdrawals from these gas fields will equably controlled. The fields concerned are Itterbeck-Tubbergene (Tubbergen on the Dutch side) and Frenswegen-Denekamp (Denekamp on the Dutch side).

With its crude capacity of 200,000 bbl. daily, the Pernis refinery of B.P.M. near Rotterdam is the largest in Europe. Additional units have been built at the refinery during the last several years. The company announced this fall that it will begin work immediately on a second fluid catalytic cracking unit. This will be about 33,000 bbl. daily capacity and will bring total catalytic cracking capacity of the refinery up to some 65,000 bbl. daily. Construction of the new unit will finish the second phase of the refinery's postwar expansion. The Caltex refinery, operated by Caltex Petroleum Mij. (Nederland), now has a rated capacity of 35,000 bbl. daily. Plans call for increasing this to 37,000 bbl. daily next year.

The Netherlands is the home of Royal Dutch Petroleum Co. which holds 60 per cent of the Royal Dutch-Shell group through several main operating subsidiaries, including B.P.M. The company has main headquarters at The Hague and its large research laboratories are situated in Amsterdam and Delft. The headquarters of Aramco Overseas Co., service company to Arabian American Oil Co., also are located in The Hague.

PORTUGAL

Area, sq. miles	35,466	Capital	Lisbon
Population	8,606,000	Refining cap., B/D	25,400

THE newly enlarged and modernized refinery of S.A. Concessionaria de Refinacao de Petroleos em Portugal (SACOR) was brought into operation the early part of this year to climax a 2-year construction program. The refinery, the only one in Portugal, now has a crude capacity of 25,000 bbl. daily and its facilities include a T.C.C. catalytic cracking unit of 10,000 bbl. daily capacity.

The operating company is about a third owned by the government and holds exclusive rights for refining in the country. The modernization and expansion program was agreed on in 1951 when the Portuguese Government extended SACOR's refining concession through 1976. The new plant, which cost nearly $10,000,000, can produce high-quality motor fuel, lubricants, asphalt, and L.P.G. Consumption of petroleum products in Portugal now amounts to about 22,000 bbl. daily.

Small-scale exploratory work has been carried on in Portugal for the last 5 years by Cia. dos Petroleos de Portugal, which is owned 51 per cent by the government and 49 per cent by the Swedish firm of A. Johnson & Co. The company has been carrying out seismograph work this year with the survey under contract to the German firm, "Prakla," (Gesellschaft fur Praktische Lagerstattenforschung, gmbH. The area under investigation is in Torres Vedras.

SPAIN

Area, sq. miles	195,504	Currency	Peseta
Population	28,086,000	Value	$0.0915
Capital	Madrid	Refining cap., B/D	85,700

THERE is no commercial oil production at present in Spain, but the country's growing consumption, now estimated at close to 50,000 bbl. daily, gives impetus to the minor amount of exploratory work under way. Spain is the location of two large refineries, both of which have been carrying out large-scale expansion programs.

The somewhat difficult terms and conditions imposed by the Spanish Government, including insistence on large if not controlling government control, has held back foreign capital investment in Spanish exploration. The only foreign group at present holding acreage in Spain represents several oil companies operating in the South-

SPAIN REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	—Special processing—
Cia. Arrendataria del Monopolio de Petroleos, S. A., Madrid—Hospitalet	700			
Cia. Espanola de Petroleos, S. A., Madrid—Santa Cruz de Tenerife, Canary Islands	40,000		3,500	R-5,000, L-500, A-2,000, V-3,000
Refineria de Petroleos de Escombreras, S. A., Madrid—Escombreras	45,000		8,200	L-27,000, P-520
Total Spain	85,700		11,700	

(1) To be completed in 1955.

PORTUGAL REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	—Special processing—
"Sacor" S.A., Concessionaria de Refinacao de Petroleos em Portugal, Rua do Alecrim 57, Lisbon—Cabo Ruivo	25,400	10,000		

west in the United States. The principal partner is General American Oil Co., Dallas. Last year, this group drilled its first well, Marcilla nort of Tudela. This test was abandoned dry at 11,205 ft.

In early July of this year the group undertook another wildcat, Castilfrio, at a location about 15 miles northeast of Sorio in the province of the same name. Delta Drilling Co. was handling the drilling.

Other exploratory work in Spain is being carried on in the northern part of the country, in the Pyrenees, by the Spanish exploration company, Cia. de Investigacion y Explotaciones Petroliferas (CIEPSA) which is a subsidiary Cia. Espanola de Petroleos, CEPSA the operator of the Tenerife refinery in the Canary Islands. Aided by the German company, C. Deilmann Bergbau, this company was drilling a well near Boltana.

The principal refinery on the Spanish mainland is the Escombreras plant located about 7 miles southeast of Cartagena. The operating company, REPESA, is owned 52 per cent by the Spanish Government's Instituto Nacional de Industria, 24 per cent by CIEPSA, and 24 per cent by Caltex which supplies Middle East crude for the plant. A major expansion of the Escombreras refinery to provide an additional 15,000 bbl. daily capacity is under way. The refinery also is constructing facilities to produce 27,000 metric tons annually of lubricating oils. Present crude capacity of the refinery is 30,000 bbl. daily. The Spanish marketing monopoly, Cia. Arrandetaria del Monopolio de Petroleos, S.A. (CAMPSA), operates a small topping plant at Barcelona. The other major Spanish refinery is that of CEPSA at Santa Cruz de Tenerife in the Canary Islands. Capacity of the plant is being raised from 25,000 to 40,000 bbl. daily, and a 5,000-bbl.-daily Platformer was to come into operation the last quarter of 1954.

RUSSIA AND EASTERN EUROPE

U.S.S.R.			
Area	8,524,750	Value	$0.25
Population	193,000,000	Refining cap., B/D	1,100,000
Capital	Moscow	Reserves, bbl.	9,500,000,000
Currency	Ruble	Production, B/D	1,140,000

PETROLEUM operations, like other activities in Soviet Russia and its Communist satellites in Eastern Europe, are shrouded in secrecy. Practically no first-hand information is available, and officially released information often serves some special propaganda purpose.

The industry in Eastern Europe was developed and operated by western oil companies before it was taken over by the Communist governments after the war. Statements made by governments such as those in Romania and Hungary can be considered in the light of facts known prior to 4 or 5 years ago, and thus be given grounds for confirmation or repudiation. Production data continue to be announced in terms of percentage gains over some base period.

Consumption of petroleum products in all these countries is closely controlled, and the degree of private usage is far below that in most western countries. With civilian consumption thus retarded, Russia appears to have developed sufficient oil to make shipments to western countries where they are to its advantage from a trade or political standpoint. In 1952, Soviet Russia exported about a million tons, equal to around 20,000 bbl. daily, mostly to Italy and Finland. Last year this was doubled, and a further increase was expected to be made in these Soviet oil shipments this year.

Russia . . . Development of the oil industry has received prime emphasis in Soviet Russia since the end of the war, and as a result production has moved up rapidly. The vast territory of Russia offers many geologically favorable areas for exploration, and the state-controlled oil organization is believed to have successfully tested a number of new regions. Production first started in the so-called Second Baku in the Ural-Volga region in 1950, and this section has developed into one of the main sources of Russian production. More recently Russian exploration found production on the west side of the Volga River in the vicinity of Stalingrad, and another discovery was made in an undisclosed part of northwestern Russia between Moscow and Leningrad.

Originally the Russian oil production goal called for an output equivalent to about 1,400,000 bbl. daily by the end of the current 5-year plan in 1955. Although the present rate of increase makes it doubtful that this will be fulfilled, output has been stepped up sharply. A report for the first-half of 1954 by the Central Statistical Administration of the U.S.S.R. Council of Ministers listed a crude-oil increase of 10 per cent. This indicates that the 1954 output will be about 1,150,000 bbl. daily since production in 1953 was announced at more than 1,040,000 bbl. daily. Probable production in 1955, if the same rate of increase is maintained, will be 1,260,000 bbl. daily.

The 1950-55 plan provided for a 100 per cent increase in refining capacity over this period along with the 85 per cent gain in production. Russia's refining capacity now is believed to closely balance production, although some of the plants are believed to consist of old and obsolete equipment. Soviet authorities have arranged to export about 75,000 bbl. daily this year to a number of noncommunist western countries. This oil, provided under trade agreements, comes from Romania as well as from Russia.

Albania . . . On the basis of official statements of Albania's Communist government, oil production last year amounted to about 5,400 bbl. daily. All current output is believed to come from fields in the central part of the country. The most important of these are along the Devoli River near the town of Kucove which has been renamed Stalin. Alsovpetrol, the Russian company which controls the Albanian oil industry, has been exploring in the south and other regions of the country, but so far as is known, has had no success. Virtually all Albania's present production is shipped to Russia's Black Sea ports for refining. A small refinery of about 3,000-bbl.-daily capacity, which will be the first in the country, is reported to be under construction at Cerrik. It is to be connected with the Devoli area by pipeline.

Czechoslovakia . . . As in most of the other Russian satellites in Eastern Europe, oil production in Czechoslovakia last year failed to reach the goal originally set. This conclusion can be drawn from officially released information. The country is stated to have produced 268.7 per cent of the 1949 level which is known to be about 1,000 bbl. daily. On this basis, production in 1953

CZECHOSLOVAKIA			
Area, sq. miles	49,358	Value	$0.14
Population	12,340,000	Refining cap., B/D	14,000
Capital	Prague	Production, B/D	2,500
Currency	Crown	Reserves, bbl.	10,000,000

amounted to around 2,700 bbl. daily. The Czechoslovakian 5-year plan has called for some 4,000 bbl. daily in 1953.

Yugoslavia . . . Although a communist country, Yugoslavia is a political ally of the West and thus falls outside the Russian orbit in Eastern Europe. Commercial production was first found in the country during World War II, and present output averages around 3,600 bbl. daily. All the production at present comes from Teritary formations, although shows have been obtained in older horizons.

YUGOSLAVIA

Area, sq. miles	95,558	Capital	Belgrade
Population	16,338,504	Currency	Dinar
Value		$0.0033	

The state oil organization has been exploring with encouraging results at Klostar and Glavnicica-Dugoselo in Croatia and at Jermenovci and Lokve in Serbia, and it is hoped to increase production considerably as a result of development of these areas. Available natural gas is utilized in a repressuring project at Donja Lendava and in a carbon-black plant at Kutina; a pipeline to supply gas for industrial use at Sisak and Zagreb is planned.

The three refineries in the country have a capacity of about 11,500 bbl. daily, using imported as well as domestic crude. The future program calls for expansion of Yugoslav refining capacity to about 16,500 bbl. daily by 1962.

East Germany . . . The Communist government of Russian-occupied East Germany is reported to be engaged in a broad exploratory program in an effort to develop worth-while oil production in this part of satellite Europe. The East German republic is said to be planning to invest the equivalent of nearly $48,000,000 in exploration in the 1954-55 fiscal year.

Apparently minor discoveries are reported to have been made near Waddekath and near Weimar. Earlier in the year the state-owned company Geologische Bohrungen was reported to have established small-scale production near Great Fallstein Mountain northeast of the Harz Mountains and near Langensalza in Thuringia.

Most of East Germany's oil supplies are produced in oil-from-coal plants using lignite, but Zisterdorf crude from Austria is processed at Lutzkendorf. Four large hydrogenations plants are operating in East Germany, three of which, at Leuna, Troglitz and Bohlen, have been taken over by the U.S.S.R. The plant at Lutzkendorf is a nationalized East German operation. The Fischer-Tropsch plant at Schwarzheide is Russian property. These plants are believed to be producing around 30,000 bbl. daily of motor fuel.

HUNGARY

Area, sq. miles	35,902	Value	$0.0861
Population	9,207,386	Refining cap., B/D	25,000
Capital	Budapest	Production, B/D	16,000
Currency	Forint	Reserves, bbl.	70,000,000

OIL production in Hungary was originally discovered and developed by European Gas & Electric Co. (Standard Oil Co. [N. J.]) through its operating subsidiary, Magyar-Amerikai Olajipari Rt. (Maort). Several relatively small fields were found prewar in the southwestern part of the country on an 8,000,000-acre concession. In 1948, after the company had regained access to its properties following the end of the war, the American officials of the company were arrested, imprisoned, and finally expelled, and Maort's assets expropriated.

Despite an intensive drilling program assisted by Russian authorities, production in Hungary amounts to only about 15,000 bbl. daily as compared to 10,500 bbl. daily in 1947 and a peak of 17,500 bbl. daily in 1943. Hungarian Communist leaders claim an output of about 17,300 bbl. daily last year, but this figure is generally discounted by persons familiar with the industry.

Some additional production has been developed in the last few years from minor field discoveries, development of areas previously considered too small for production, and from deeper drilling. The mainstay of the production still is the group of old Maort fields. The 1953 program called for 853,000 ft. of drilling, but it is extremely doubtful if this was realized. The program for the current year provided for only 250,000 ft. of drilling. The drop was not explained by the Communist authorities, but it appears due largely to failure of the Soviets to deliver promised equipment and to the general industrial slowdown in Eastern Europe.

Hungary is believed to be operating about three refineries with a total capacity of 30,000-35,000 bbl. daily.

ROMANIA

Area, sq. miles	91,584	Capital	Bucharest
Population	15,873,000	Currency	Leu
Value		$0.1666	

ESTIMATES of Romanian oil production made by western experts on the basis of careful study and analysis are far below the output that is claimed by the Communist authorities of this iron-curtain country. Romania's prime minister has given the figure of 9,300,000 tons, or about 186,000 bbl. daily, as the production in 1953, and the target next year officially calls for a production of 11,000,000 tons, or 220,000 bbl. daily.

These figures are in sharp disagreement with the known facts on conditions of the fields, drilling, and depletion of the oil resources of the country. Most of the western oil officials who are familiar with Romania's petroleum industry doubt if the total output is better than 120,000-125,000 bbl. daily. Prewar, Romania had the most flourishing producing industry in Europe with a production that reached a peak of 8,600,000 tons, or 172,000 bbl. daily, in 1936. Several of the major international companies were represented in the Romanian oil industry. In June 1948, all these private properties were expropriated, and the following year the entire Romanian oil industry was turned over to the Russian-controlled Sovrompetrol company. Even before the expropriation, Romania's most important producing areas were in a state of decline with decreasing gas pressure and and dropping yield from drilling.

Most estimates place current Romanian refining capacity in the 135,000-155,000-bbl. daily range. The Communists claim that the war-destroyed refineries in the Ploesti region have been rebuilt. Much of Romania's production has been exported to Russia or other Soviet satellites. Indicative of the supply situation in Romania itself is the fact that only one filling station in Bucharest sells premium-grade motor fuel and this is reserved for high Communist officials.

SCANDANAVIAN COUNTRIES

DENMARK

Area, sq. miles	16,575	Currency	Krone
Population	4,303,000	Value	$0.1450
Capital	Copenhagen	Refining cap., B/D	985

AN exploration program which began in Denmark in 1938 came to an end this year when Danish American Prospecting Co., a wholly owned subsidiary of Gulf Oil Corp., suspended further work in the country. The decision was taken in view of an almost complete lack of success. The company's total outlay in the program amounted to approximately $10,000,000, but the only oil found was in small shows in 1952 at around 10,000 ft. near Tonder in southern Jutland near the German border. A total of about 180 wells were drilled, including several deep tests. The exploration located large salt deposits during drilling.

Denmark provides a large and growing market for petroleum products. Inland consumption last year amounted to 1,967,000 tons, or about 40,000 bbl. daily, up 13 per cent over 1952, and a further increase was anticipated this year. Motor fuel makes up more than a quarter of the total. In an attempt to improve its one-sided trade with Russia, the Danish Government considered arranging increased imports of Soviet oil, but the negotiations were later suspended. The oil companies marketing in the country took the position that they were ready to meet Russian competition, but objected to any arrangement under which they would be required to purchase and market Russian oil through their own established distribution outlets. It was felt that the Russians should establish their own importing and marketing organization if they wished to compete for a share of the market. There are three small refineries in Denmark, but most of the country's petroleum is imported as products from elsewhere in Europe. One of the largest suppliers is the Esso refinery at Fawley in England which meets most of the requirements of Dansk Esso A/S. Denmark's foreign-exchange bill for fuel and lubricants is the largest of any of its import items.

SWEDEN

Area, sq. miles	173,426	Currency	Krona
Population	7,073,000	Value	$0.1935
Capital	Stockholm	Refining cap., B/D	35,800

NORWAY

Area, sq. miles	124,710	Currency	Krone
Population	3,309,000	Value	$0.1405
Capital	Oslo	Refining cap., B/D	1,800

Sweden . . . Swedish oil consumption, the highest in Europe on a per capita basis, showed a further increase this year. Estimated consumption is about 120,000 bbl. daily, a gain of around 10 per cent over 1953. The Soviet Union made some small shipments to Sweden in 1953 but moved in on the market on a large scale early this year when it signed a trade agreement with Sweden calling for the import of up to 600,000 tons of unspecified products. The Russians negotiated with the Swedish oil-marketing companies to handle the products.

Sweden's three refineries meet roughly a third of the country's total consumption. A/B Nynas-Petroleum represents A. Johnson & Co. The other refinery operating company, Koppartranz, is owned by Stora Kopparbergs Bergslags, a leading Swedish timber and steel company, and Transatlantic Shipping Co. of Gothenburg. The Koppartranz company this summer contracted for the erection of a 3,000-bbl.-daily Atlantic Refining Co. Catformer at its Skarvik refinery. There is no indigenous oil production in Sweden, and only a minor amount of exploratory work. Early this year Stora Kopparbergs Bergslags applied for exploratory concessions over two small areas in South Scania.

Norway . . . Norway is supplied almost entirely by products imports. The single small refinery, producing mainly lubricants and asphalt, is operated by a subsidiary of Standard Oil Co. (N.J.). The country has a consumption estimated this year at about 41,000 bbl. daily—on a per capita basis the next highest in Europe after Sweden. Norwegian nationals are active as charter tanker operators, owning the world's third largest fleet amounting to nearly 5,500,000 deadweight tons.

DENMARK REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Dansk Mineraloliefabrik, Lyneborggade 9, Copenhagen—Copenhagen	65			L-60, A-5
A/S Kalundborg Olieraffinaderi, 13 Sankt Annae Plads, Copenhagen—Kalvandborg	850			
L. C. Glad Co., A. S., Copenhagen—Copenhagen	70			
Total Denmark	985			

NORWAY REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Norske Esso A/S, Prinsensgate 5, Oslo—Valloy Pr. Tonsberg	1,800			L-300, A-900

SWEDEN REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
A. B. Nynas-Petroleum, Nynasham:				
Nynasham	12,000		2,900	
Malmo	1,800			
Koppartranz Oljeaktiebolag, Gothenburg—Skarvik	22,000		4,500	
Total Sweden	35,800		7,400	

UNITED KINGDOM

Area, sq. miles	94,279	Value	$2.82
Population	50,368,455	Refining cap., B/D	464,950
Capital	London	Production, B/D	1,200
Currency	Pound	Number of fields	6
Reserves, bbl.		4,200,000	

DESPITE the fact that it has lost substantial segments of its overseas empire since the end of the war, Britain remains the dominant financial, business, and commercial center, particularly for trade in the Eastern Hemisphere. As the world's greatest trading nation, its currency is widely used in international commerce, and this fact alone is sufficent to justify the close ties which all the large international oil companies have to London.

British nationals control a large part of the world oil trade. British enterprise developed the first Middle East oil production in Iran at the turn of the century, and the large British stake in this region is reflected in the fact that all the large Middle East operating companies except Arabian American Oil Co. are headquartered in London. The activities of British Petroleum Co., Ltd., (Anglo-Iranian Oil Co., Ltd.), are directed from its headquarters in Britannic House in London. Also in London are the offices of the British side of Royal Dutch-Shell. Among the other important British companies are Kuwait Oil Co., Ltd.; Iraq Petroleum Co., Ltd., the new Iranian consortium holding company; Trinidad Leaseholds, Ltd.; Manchester Oil Refinery, Ltd., as well as the subsidiaries of American companies such as Esso Petroleum Co., Ltd., and Vacuum Oil Co., Ltd.

Britain ranks after the United States as the largest petroleum consuming country of the Free World. Its refining capacity is third after that in the United States and the Netherlands West Indies. There is a large and growing equipment industry in the country whose growth has been encouraged particularly by the need of oil companies with foreign operations to shift their expenditures into sterling currency. The British tanker fleet is growing much more rapidly than that under the American flag, and is expected to exceed United States tonnage in the near future.

Total British consumption of petroleum products during the first half of 1954—excluding fuel deliveries to ships engaged in foreign trade—amounted to 10,278,252 tons, or about 415,000 bbl. daily. This was an increase of 10 per cent over the same period of 1953. Of interest in the pattern of United Kingdom petroleum consumption is the fact that premium grades of motor fuel accounted for 46 per cent of all deliveries in the half year. In the

UNITED KINGDOM PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Formby	1939	85-130		10			4	68,000	36.9	Keuper ss.
Eakring	1939	1,800-2,500		45			200	1,730,000	34.9	Millstone sd.
Duke's Wood	1941	1,800-2,500		111			550	2,820,000	33.0	Millstone sd.
Kelham Hills	1941	2,000-2,200		46			410	1,370,000	27.4	Millstone sd.
Caunton	1943	2,000-2,200		10			26	200,000	29.3	Millstone sd.
Plungar	1953	2,900		2		1	18	4,000	24.0	Millstone sd.
Total United Kingdom				222		1	1,208	6,192,000		

UNITED KINGDOM REFINING

England

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Manchester Oil Refinery, Ltd., Twining Road, Trafford Park, Manchester 17:				
Manchester	3,500			L-1,750, V-2,500
North Rochester	1,250			
Berry, Wiggins & Co., Ltd., Field House Breams Buildings, Fetter Lane, London E. C. 4—Weaste	2,200			
Esso Petroleum Co., Ltd., 36 Queen Anne's Gate, London S. W. 1—Fawley	146,000	40,000	3,750	P-8,550, L-2,100, A-207
Kent Oil Refineries, Ltd., Britannic House, Finsbury Circus, London E. C. 2—Isle of Grain	90,000	12,500		R-6,000
Lobitos Oilfields, Ltd., 146 Dashwood House, Old Broad St., London E. C. 2—Ellesmere Port	4,200		800	V-1,100, A-150, L-650
"Shell" Refining & Marketing Co., Ltd., Houndsditch, London E. 1—Heysham	36,000		10,200	
"Shell" Refining & Marketing Co., Ltd., and Starhaven Refineries, Ltd., Houndsditch, London E. 1:				
Ardrossan	3,200			
Shell Haven	66,600		9,200	
Stanlow	91,000	28,000	9,200	R-9,200
Vacuum Oil Co., Ltd., Caxton House, Tothill Station, London S. W. 1—Coryton	21,000	15,000	2,500	V-10,000, L-2,000
Total England	464,950	95,500	35,650	

Scotland

Grangemouth Petroleum Refinery, Ltd., Bo'ness Road, Grangemouth, Stirlingshire	60,000	12,500		P-2,200, V-18,000
Scottish Oils, Ltd., 53 Bothwell St., Glasgow C. 2.—Pumpherston	3,500		2,800	C-15
Total Scotland	63,500	12,500	2,800	

Wales

National Oil Refineries, Ltd., Britannic House, Finsbury Circus, London E. C. 2—Llandarcy	90,000	12,500		R-6,000, L-2,000
Total United Kingdom	618,450	120,500	38,450	

United States, premium sales make up about a third of the total. Since refining capacity is considerably above domestic consumption, United Kingdom refineries exported approximately 4,000,000 tons, or an average of about 160,000 bbl. daily, of refined products during the first half. This export trade in products earned £3,500,000, equivalent to nearly $122,000,000. Almost a third of the total earnings during the period came from fuel oil (£14,690,000) with gasoline the next most important (£10,300,000).

At the middle of this year, total tonnage of British-flag tankers amounted to 7,057,033 tons deadweight, according to data compiled by the tanker firm of John I. Jacobs & Co., Ltd. This compares to the United States fleet of 8,715,157 tons total. There were 530 active British tankers afloat as compared with 571 under the United States flag. However, there were 3,000,000 tons of tankers on order in the United Kingdom, 12 times the amount under construction in the United States. Lower construction costs and the fact that it offers an outlet for sterling utilization has encouraged tanker construction in British yards. The impact of the oil trade on the important British shipping industry is reflected in figures on the distribution of type of vessels. In 1936, British tanker tonnage was around 2,000,000 tons gross, or 12 per cent of the total United Kingdom tonnage; in 1953 this figure was 4,533,000 tons gross, representing just over 25 per cent of total British tonnage. In 1953, Britain imported more than 11 times as much crude oil as in 1938 but shipped considerably less than half as much coal, which historically has been the mainstay of Britain's fuel resources.

Prior to the war Britain contented itself with imports of products and never sought the construction of a large domestic refining industry. The postwar economic difficulties spurred a refinery-construction program which has given the country a total capacity of nearly 600,000 bbl. daily. The buildup is largely complete, and the work now under way consists principally of improvements and construction of specialized processing units.

Grangemouth Expansion Completed

This fall British Petroleum (Anglo-Iranian) completed the last phase of the postwar expansion program of its Grangemouth refinery in Scotland when it placed in operation a catalytic polymerization plant, Girbotol unit, and sulfur recovery plant. This same company during the summer began work on erection of two Platforming units, one at the Llandarcy refinery in Wales and the other at the Kent refinery.

During the spring, official dedication ceremonies were held for the new Coryton refinery which is operated by Vacuum Oil Co., Ltd., on the Thames Estuary. Another Platformer was undertaken by Shell at its Shell Haven refinery. Lubricating-oil facilities were commissioned at the Kent refinery. At Shell's Stanlow refinery, the first plant in Britain for the production of isopentane was under construction and due to be completed early in 1955.

Oil and chemical companies in Britain have been quick to take advantage of the opportunity for petrochemical manufacture. British Petroleum Chemicals, Ltd. (Anglo-Iranian and The Distillers Co., Ltd.), produces synthetic ethyl alcohol at Grangemouth, and the subsidiary Forth Chemicals, Ltd., produces monomeric styrene. British Petroleum Chemicals this year entered into an agreement with Oronite Chemical Co. (Standard Oil Co. of California) to produce detergent alkylates used in the manufacture of synthetic detergents. Imperial Chemical Industries, Ltd., has spent nearly $600,000,000 since the end of the war on expansion, a significant proportion of which was for developing the Wilton Works where operations are based essentially on oil cracking. Shell and Monsanto also are active in chemical operations in the United Kingdom.

Developments on the exploration side in the United Kingdom over the last year gave promise of further small-scale oil production. British Petroleum-Anglo-Iranian's exploration subsidiary, D'Arcy Exploration Co., Ltd., found a minor field at Plungar near Nottingham where the discovery well was pumped at about 25 bbl. daily. Total production from all fields in Britain amounts to about 1,200 bbl. daily.

WEST GERMANY

Area, sq. miles	94,723	Value	$0.2385
Population	48,117,000	Refining cap., B/D	262,470
Capital	Bonn	Production, B/D	51,500
Currency	Deutsche Mark	Producing fields	64
	Reserves, bbl.	435,000,000	

THE petroleum industry stands out as a bright spot in the booming activity of West Germany. The production curve continues upward, and domestic output meets about a third of a rising consumption. Natural-gas production and utilization are showing sharp increases, and a petrochemical industry is beginning to take its place in the traditionally coal-based German chemical business. Oil refining continues to expand with emphasis on construction of second-stage processing facilities. In West Germany, the gain in oil activity has outstripped that of other major industries. Oil's production index in 1953 was 492 per cent of the 1936 base year compared with 212 for electric power, for example, and 158 for industrial production generally.

Up through the middle of this year, five new oil fields had been found in West Germany in 1954. Well over 100 rigs are in operation in an extensive exploration and drilling program. This resulted in seven new field discoveries in 1953. Since the end of the war, some 40 new fields have been discovered in West Germany, the best of which are in the Emsland region along the Dutch frontier and in the northernmost state of Schleswig-Holstein. Exploratory drilling is now taking place along the Baltic Coast, along the upper Rhine between Frankfurt and Basel, and in various other wildcat territories. In the second quarter of this year, 138 deep wells of all types were completed in West Germany, of which 65 per cent were productive of oil or gas. Of the 27 exploratory wells, 4 encountered oil, and 1 gas. Of 24 extension wells, 14 proved successful, and of 81 field wells, 71 were productive. At the middle of this year, 99 wells were being drilled.

West Germany's crude production during the first half of the year amounted to 1,257,658 tons, or around 49,000 bbl. daily. The country's output is the largest in Western Europe. In 1936, all of Germany produced only about 8,700 bbl. daily, and at the end of the war, some Allied geologists felt the country's prospects were so poor as to not justify large-scale exploration. West Germany's own oil-industry association expects production to continue to increase, though at a somewhat slower rate, perhaps reaching 61,000-62,000 bbl. daily in 1958. Although many of the fields are small by comparison with those in the large oil-exporting countries of the world, West German oil production is of prime importance to its own economy.

Natural-gas production in the first 6 months showed a 50 per cent gain over the corresponding 1953 period, exceeding 2½ billion cubic feet. An increasing volume of

gas is being drawn from the new fields on the Dutch border, Itterbeck-Halle and Frenswegen. Early this year, the four large Emsland producers contracted with Huels Chemical Co. and Ruhrgas, A.G., for gas deliveries from the Dutch border fields.

Coal continues to be the basic fuel and chemical production raw material in West Germany, but considerations of price and availability are causing the producers to bring petroleum-based stocks into the framework of their operations. There is a rising production of ethylene which hitherto was obtained chiefly from coke-oven gas. Natural gas from the new field at Pfundstadt in Hesse is being used to produce chlorinated solvents at the Farbwerke Hoechst. Petrochemicals are providing a new outlet for the German chemical industry, though limited by the long-established and highly-developed operations based on coal tar.

German refining capacity is expected to top 200,000 bbl. daily by the end of this year. Cracking facilities will amount to some 72,000 bbl. daily, including 50,000 bbl. daily of catalytic cracking. Product imports are now limited to aviation gasoline and a few other specialties. German refineries produce motor fuel at a yield of 32 per cent of crude throughput compared with a 27 per cent average in other countries of Western Europe. Consumption of petroleum products in West Germany amounted to about 150,000 bbl. daily the first half of this year, a gain of 3.7 per cent over the same period of 1953.

Among the new refinery units brought on stream this year were the Platformer and other improvements at the Hamburg refinery of the Anglo-Iranian subsidiary, BP Benzin-und Petroleum GmbH.; a 10,000-bbl.-daily fluid catalytic cracking unit at the Hamburg refinery of the Standard Oil Co. (N. J.) affiliate, Esso A.G.; and the completely new 11,000-bbl.-daily Emsland refinery of Gewerkschaft Erdoel-Raffinerie.

GERMANY
Emsland District

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data on prod. formation
Adorf	1946	4,000-4,400			1			47,249	30	L. Cret. shell
Emlichheim	1944	2,400-2,900		75	39	2	3,015	6,364,120	25	L. Cret. sd.
Georgsdorf	1944	1,600-3,300	106	53	45		4,616	7,753,976	24-29	L. Cret. sd., ss.
Lingen	1942	2,300-3,900	2	170	43	3	2,430	5,150,642	30-32	L. Cret., Jur. sd., l and ls.
Ruhlermoor	1949	2,000-2,800	49	112	30	2	5,858	4,309,179	25	L. Cret. sd.
Ruhlertwist	1949	2,350-2,900				3	2,797	2,933,259	25	L. Cret. sd.
Scheerhorn	1949	2,500-3,700	31	25	2	1	2,148	1,515,985	30	L. Cret. sd.
Total Emsland			188	435	160	11	20,864	28,074,410		

GERMAN REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	—Special processing—
Badische Anilin & Soda-Fabrik AG., Ludwigshafen on Rhine—Ludwigshafen-Oppau	1,000			L-200
BP Benzin und Petroleum-GmbH., Hamburg 1, Steinstrasse 5—Hamburg-Finkenwerder	28,000		8,500	R-5,000
Deutsche Erdoel-AG., Hamburg 13, Mittelweg 180:				
Heide	12,600	7,800		L-1,600
Wietze	1,400			
Deutsche Gasolin AG., Hannover, Jordanstrasse 32—Dollbergen	2,500			L-800
Deutsche Shell AG., Hamburg 36, Alsterufer 4-5:				
Hamburg-Harburg	19,000			L-2,000
Monheim	4,300			L-1,300
Deutsche Vacuum Oel AG., Hamburg 1, Steinstrasse 5—Bremen-Oslebshausen	15,000	7,800		L-1,000
Esso AG., Hamburg 36, Neuer Jungfernstieg 21—Hamburg-Harburg	40,000	10,000	3,500	L-1,600
Gelsenberg Benzin AG., Gelsenkirchen—Gelsenkirchen	39,000	10,000		R-8,000, H-14,000
Gewerkschaft Deurag-Nerag, Hannover, Hindenburgstrasse 27-29—Misburg	12,000		6,600	L-1,600
Gewerkschaft Erdoel-Raffinerie Emsland, Lingen (Ems)—Lingen-Holthausen	11,000	17,500		
Gewerkschaft Greiff Bergbau Mineraloelraffinerie/Chemische Fabriken Mineraloelwerke Hermann Pfeifer GmbH., Dollbergen—Dollbergen	500			
Kraftstoff-Handelsgesellschaft GmbH., Essen, Rathenaustrasse 6—Essen-Altenessen	[1]1,700			
Mineraloel und Asphaltwerke AG., Hamburg 1, Ballindamm 14-15—Ostermoor on Kiel-Canal	2,100			
Mineraloelwerke Albert Sengewald, Dedenhausen—Dedenhausen	[1]900			
Mineraloelwerke Peine, Peine—Peine	400			
Oelwerke Julius Schindler GmbH., Hamburg 36, Hohe Bleichen 28—Hamburg-Neuhof	4,300			L-650
Ruhrbau GmbH., Muelheim/Ruhr, Timmerhellstrasse—Muelheim	[1]6,500			
Ruhrchemie AG., Oberhausen-Holten—Oberhausen-Holten	[1]6,000	(2)		R-1,500
Ruhroel GmbH.., Bottrop—Bottrop-Welheim	2,500		850	
Scholven-Chemie AG., Gelsenkirchen-Buer, Dorstenerstrasse 227—Gelsenkirchen-Buer	21,000	5,100		R-2,100, H-6,400
Union Rheinische Braunkohlen Kraftstoff AG., Wesseling—Wesseling	28,000		16,700	H-7,100
Wintershall AG., Kassel, Friedrich Ebert Strasse 160—Salzbergen	2,100			L-430
Zeller & Gmelin, Eislingen/Fils—Eislingen	[1]170			
Total Germany	262,470	58,200	36,150	

(1) Currently not operating. (2) A thermal cracking unit is going to be converted to a catalytic cracking unit with 2,100-bbl. daily capacity, completion planned early in 1955.

GERMAN PRODUCTION (Continued)

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Hamburg District										
Reitbrook	1937	1,400-2,600	71	63	70		1,152	9,997,964	21-22	U. Cret., L. Eoc. sd., l.
Hanover District										
Broistedt	1937	2,400-3,200		9			72	373,417	35	L. Cret. ss.
Calberlah	1945	160-400		8			9	47,460	22	Jur. ss.
Eddesse-Nord	1950	500-1,170	6	63	9	1	979	541,865	26-34	L. Cret., Lt., Tri. ss.
Eddesse-Oelheim	1876	2,900-3,300					42	1,696,497	32	Triassic ss.
Ehra	1939	400-820		13			7	82,560	16	Jurassic ss.
Eicklingen-Wienhausen	1937	1,650-3,100		17	3		158	2,007,169	32-33	L. Cretaceous ss.
Eilte	1947	3,560-3,700		1			4	12,718	23	L. Cretaceous sd.
Eldingen	1949	4,900-5,300	15	30	1	2	1,909	2,158,819	35	Jurassic sandstone
Fuhrberg-Hambuehren	1939	260-2,170		241	85		766	4,549,738	22-23	Jurassic sandstone
Gifhorn	1935	650-1,000		37	4		38	350,922	16	L. Cretaceous ss.
Hademstorf	1941	4,100-5,400		10	4		128	655,814	25-29	L. Cret., Jur. s., ls.
Hankensbuttel	1954	5,000-5,300	5	1		5	1,614	124,477	33	Jurassic sand
Hohenassel	1943	1,450-2,100		44	12		483	1,779,205	31	Jurassic limestone
Hohne	1951	4,400-6,500	25	7	8		3,230	2,515,750	33-34	Jurassic, Triassic ss.
Kronsberg	1953	2,000	1	4		2	141	14,647	27	Jurassic sandstone
Lehrte	1952	3,600-4,000	5	2	2	4	513	140,921	31	Jurassic sandstone
Meckelfeld	1938	1,000-1,670		21	1		45	412,758	24	Cretaceous ss., lime
Moelme	1935	160-1,800		5	7		40	1,092,005	32	Cret., Jur. ss., ls.
Nienhagen	1899	600-5,350		232	106	1	1,433	33,212,304	22-32	Jur. sand, ss., ls.
Nienhagen-Haenigsen	1940	2,250-2,770					692	3,451,047	24-28	L. Cret. sand, ss.
Oberg	1918	500-1,900		50	6		123	209,186	36-46	L. Cret., Jur. sand
Oerrel-Sued	1954	4,540-4,560					46			Jurassic sandstone
Pattensen	1954	2,000					5			Jurassic sandstone
Ruehme	1954	2,300	1				78	2,570		Jurassic
Steimbke	1936	790-3,700		220	12		1,270	5,889,962	18	Cret., Jur. ss., ls.
Suderbruch	1949	3,800-7,650	9	52	15	2	3,100	3,813,747	25-37	Cret., Jur. ss., ls.
Thoeren	1941	1,550-4,100		63	9		348	1,597,342	19-38	L. Cret., Jur., Tri. ss.
Vechelde	1954	6,000			1		25	156	31	Triassic sandstone
Vorhop	1952	3,200-5,200	1	2		2	115	47,080	36	Jurassic sand, ss.
Wathlingen	1950	2,000	(included in Nienhagen figures)				203	251,257	27	Cretaceous sandstone
Wesendorf	1943	1,200-6,300	18	54	30	1	1,525	4,648,500	17-42	Cret., Jurassic ss.
Wietze	1879	300-1,000		283			532	17,483,474	16-29	Cret., Jur., Tri. ss.
Total Hanover			86	1,469	315	20	19,673	89,163,367		
Schleswig-Holstein District										
Boostedt	1952	5,550-6,300	10	4	1	3	1,480	532,685	29-31	Jurassic sand
Bramstedt	1954	6,250-6,530	1				285	4,175	34-35	Jurassic sandstone
Heide	1935	2,600-5,900	5	62	69	3	1,500	11,249,240	21-32	Cret., Jurassic ss.
Ploen	1952	6,500	7			2	1,000	313,458	34	Jurassic sandstone
Total Schleswig-Holstein			23	66	70	8	4,265	12,099,558		
Upper Rhine Valley District										
Forst-Weiher	1934	1,200-2,600		42		1	32	621,273	32-34	Tri., Jur., Tert. ss.
Rot	1953	2,100-2,500		7		1	335	91,313	25-26	Tri., sandy clay with fissure
Stockstadt	1952	1,600	2	4		4	1,027	316,028	29	Oligocene sandstone
Wattenheim	1954	7,500		1			40	1,740		Oligocene sand
Weingarten	1936	800-3,600		96	8	1	47	371,889	32-36	Olig., Tri. sand, ss.
Total Upper Rhine Valley			2	150	8	7	1,481	1,402,243		
Weser-Ems District										
Aldorf	1952	3,400-3,600	13	11	3	3	1,974	602,911	32	Jurassic sand, ss.
Barenburg	1953	2,300-2,550	3		1		770	12,233	29	L. Cretaceous sand
Bockstedt	1954	3,900		1		2	180	14,015		L. Cretaceous sand
Dickel	1953	4,600			1	5		2,420		Jurassic
Dueste	1954	2,800								L. Cretaceous ss.
Etzel	1942	4,550-4,700		5		1	62	300,409	13	Jurassic lime breccia
Garen	1953	3,200-4,400				1	37	1,349	28	L. Cret., Jurassic
Hemmelte-West	1951	3,700-4,500	24	3	10	2	2,589	1,455,002	32	Jurassic ls., ss.
Liener	1953	2,600-4,500		3	2		127	19,809	31	Jurassic sandstone
Molbergen	1953	2,400		8	1	1	294	70,276	26	Jurassic limestone
Ostenwalde	1953	4,200-4,900		2	1	1	25	10,288		Cretaceous, Jurassic
Quakenbrueck	1950	1,270-1,950		8	4		62	329,998	35	Cret., Jurassic ls.
Voigtei	1953	1,500-1,700	11		4	1	720	164,905	31-34	Jurassic
Total Weser-Ems			51	41	27	17	6,840	2,983,615		
Bavaria										
Ampfing	1954	5,900				1			20	Tertiary sand
Isen	1954	6,500				1			18	Tertiary
Total Bavaria						2				
Total Germany			421	2,224	650	65	54,275	142,721,157		

Southern and Eastern Asia

BURMA

Area, sq. miles	261,789	Capital	Rangoon
Population	18,674,000	Currency	Kyat
Value		$0.2115	

THE outstanding petroleum development in Burma during the past year was the partial nationalization of the industry by government purchase. Several years of discussion and negotiation were culminated January 12 when an agreement was signed under which the Burmese Government for $14,000,000 acquired a third interest in the Burmese producing and refining properties of Burmah Oil Co., Ltd., and two smaller British concerns, Indo-Burma Petroleum Co., Ltd., and British-Burmah Petroleum Co., Ltd.

Mechanics of the agreement provided for transfer of the company's assets to a new public Burmese company—Burma Oil (1954) Ltd., and the subsequent purchase of a third of the shares by the government. Half the price of the third government interest, or $7,000,000, was paid at once, and the government was given the option of paying the remainder in installments. The agreement also gave the government the right to buy further holdings in the new company once its initial purchase was paid.

This so-called "joint-venture" activity requires an increasing use of Burmese nationals in all phases of industry operations. Distribution remained in the hands of the companies which are acting as a sales agent on a 2½ per cent commission basis. The government, however, was given the right to acquire an interest in distribution once producing and refining in Burma meet domestic requirements.

Industry Hasn't Recovered From War

The Burmese oil industry, which was producing crude oil as far back as 1888, has never recovered from the devastation it suffered during World War II when the Japanese overran the country. Burma obtained its independence from Britain in 1947, but internal chaos and a near state of civil war prevented the British oil companies from carrying out plans to rehabilitate the Syriam refinery 4 miles south of Rangoon and reconstruct the pipeline linking this plant to the field area.

At present, all Burmese production comes from Chauk field where average per well output is about 15 bbl. daily. Burma Oil Co., which in the postwar period has acted as manager for all three companies, has expanded a small field topping plant at Chauk to provide approximately 3,000 bbl. daily capacity. The new facilities, consisting of a two-stage Winkler Koch plant, wax-sweating and pressing equipment, bauxite-treating plant, and equipment for ethyl blending, were dedicated early in January, only about a week before the signing of the joint-venture agreement.

The aim of the new company, and the hope of the government which is now a partner, is to rebuild the industry sufficiently to meet all internal needs and to regain some of the lost export market. The goal is a production of 10,000 bbl. daily. The Burma Geological Department has estimated that presently proved reserves of the country can justify production of 10,000 bbl. daily for 10 to 15 years, with some 20,000,000 bbl. left to be recovered at a declining rate.

FORMOSA

THE first promise of more substantial oil production in the Chinese Nationalist territory of Formosa (Taiwan) was obtained early this year when the government-owned Chinese Petroleum Corp. made a discovery at Chutauchi at the southern end of the island.

Efforts to find oil in Formosa date back to 1904. Prior to World War II, the Japanese drilled more than 250 wells, most of them dry. Production, most of it from the old Chuhuangkeng (Shukkoko) field in Central Formosa, reached a peak of about 200 bbl. daily in 1927. Prior to the recent discovery, output had been averaging around 50 bbl. daily with some 25 wells in operation in the Shukkoko area.

Exploratory work by C.P.C. has been assisted by the Foreign Operations Administration. The newly productive structure to the south is a long, narrow anticline with a total length of around 16 miles. The discovery was made in the second well drilled. The well was brought in at about 2,600 ft. and was placed on pump at better than 60 bbl. daily of 38.9°-gravity paraffin-base crude with a gasoline content of 35 per cent. Insignificant production had been developed earlier by the Japanese at the southern end of the structure.

C. P. C.'s main refinery at Kaohsiung on the southwestern coast embarked on a major improvement program this year. A contract was let for the construction of a T.C.C. catalytic cracking unit of 10,000-bbl.-daily capacity, along with other new plant. C.P.C. also operates a small topping plant on Formosa at Miaoli.

BURMA PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Chauk-Lanyna[1]	1902	2,500		74			3,900	293,000,000	36	Oligocene ss.

1. Includes other fields.

BURMA REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
The Burmah Oil Co. (Burma Concessions), Ltd., P. O. Box 1049, Merchant St., Rangoon—Chauk	3,000			

FORMOSA

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Chinese Petroleum Corp., 71 Goan Chyan Road, Taipei, Taiwan—Kaoshiung	15,000	[1]6,500	[1]2,000	

(1) To be completed in 1955.

INDIA

Area, sq. miles	1,221,880	Value	$0.2115
Population	356,829,485	Refining cap., B/D	83,700
Capital	New Delhi	Reserves, bbl.	50,000,000
Currency	Rupee	Production, B/D	7,000
Producing fields		2	

INDIA seems on its way toward achieving a measure of the petroleum self-sufficiency for which its government has been striving. One large new refinery opened last summer, and two more are under construction. The single producing company is developing the country's second oil field, and the government is studying a project to manufacture hydrocarbons from coal.

India has a large and growing petroleum consumption and is one of the most important oil markets in Southeast Asia. Consumption this year is running close to 90,000 bbl. daily. Some 30 per cent of this, significantly, is kerosine which is widely used for cooking and lighting. The country is moving toward industrializaton, and the emphasis on petroleum is heightened by the memory of the narrow margin by which disastrous shortages in oil supplies were averted immediately after the nationalization and shutdown in Iran in 1951. The major oil companies serving the India market, Burmah-Shell, Standard-Vacuum, and Caltex, resorted to highly unusual and uneconomic expedients at that time.

The new Indian refinery is the first to be completed of three being built under a series of agreements negotiated with the government the latter part of 1951 and early 1952. These gave guarantees against nationalization, assurance of foreign exchange for profits remission, and other concessions. The oil-company agreements with Standard-Vacuum, Burmah-Shell, and Caltex provided the first large-scale inflow of foreign capital investment in India since its independence in 1947.

Standard-Vacuum's subsidiary, Standard-Vacuum Refining Co. of India, Ltd., brought its new 25,000-bbl.-daily plant near Bombay on stream last July, 6 months ahead of the original schedule. The site is on Trombay Island on the outskirts of Bombay. The plant incorporates the most modern process facilities, built around a combination unit. The Model IV fluid catalytic cracking unit has a capacity of 5,100 bbl. per stream day in fresh feed.

Next of the new refineries scheduled to open is even larger. This is the 40,000-bbl.-daily plant of Burmah-Shell which is being built on Trombay Island near the Standard-Vacuum facility. This refinery also includes catalytic cracking. Both the Burmah-Shell and the Standard-Vacuum plants will receive crude and dispose of a part of their production through a system of submarine pipelines extending to Butcher Island where large tankers can be accommodated. The lines and the terminal are owned by the Bombay Port Trust.

Work on the third refinery, to be built by the Caltex organization, is due to begin next year. It will be situated on India's East Coast at Vishakapatnam and will have a capacity of 10,000 bbl. daily. All three of these refineries will operate off imported crude oil.

The first oil discovery in 60 years in the territory that now comprises India was made by the Assam company (a subsidiary of Burmah Oil Co., Ltd.) about 20 miles southwest of old Digboi field. By the latter part of this summer, three wells had been completed in the area. They have an output of about 500 bbl. daily each from formations below 10,000 ft.

Early in 1954, announcement was made of the conclusion of an exploration agreement between the Indian Government and Standard-Vacuum. The company was given rights over 10,000 sq. miles of the Bengal Basin under an unusual contract which provided that the Indian Government would take a 25 per cent interest in the venture in return for putting up 25 per cent of the funds required. The government also has been attempting to interest Caltex and Burmah-Shell in exploratory work in India.

The government continued to make plans to carry out the coal-to-oil synthetic project which was dropped in 1948 and then revived 5 years later. Under study was a plant which would produce around 2,000 bbl. daily of gasoline, along with various chemicals. Cost would be approximately $42,000,000.

INDONESIA

Area, sq. miles	735,865	Value	$0.0881
Population	76,500,000	Refining cap., B/D	214,000
Capital	Jakarta	Reserves, bbl.	1,900,000,000
Currency	Rupiah	Production, B/D	208,000
Producing fields		53	

POLITICAL turmoil, guerilla activities, and an uncertain future have troubled the oil industry in Indonesia since the end of the war. This unfavorable governmental setting

INDIA PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Number of wells: Pumping	Number of wells: Shut in	Number of wells: Midyear drilling	Prod. in bbl.: July dly. avg.	Prod. in bbl.: Accum. to July 1	Gravity, °A.P.I.	Geological data on prod. formation
Digboi	1890	3,000	30	[1]560	190	4	6,700	51,500,000	36	Miocene sandstone
Nahorkatiya	1953	10,000	2						34	Oligocene sandstone

1. Includes 370 wells on gas lift. 2. Includes both fields.

INDIA REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Assam Oil Co., Ltd., Digboi P. O., Upper Assam—Digboi	5,900		1,500	
Burmah-Shell Refineries, Ltd., Bombay—Bombay	(1)			
California Texas Oil Co., Ltd., 380 Madison Ave., N. Y. C., N. Y.—Vishakatnam	(2)			
Standard-Vacuum Refining Co. of India, Ltd., Anand Bwahan, 54 Warden Road, Post Bag No. 6516, Bombay 26—Bombay	27,800	5,100	4,200	
Total India	33,700	5,100	5,700	

(1) 40,000-bbl. refinery to be on stream in 1955. (2) 10,000-bbl. refinery to be built in 1955.

EAST INDIES

Standard-Vacuum seeks to work out basis for continued long-term operations in Indonesia in negotiations with government . . . Uncertainty and political turmoil has left little incentive for making capital investments the Indonesian industry needs . . . Caltex production in Central Sumatra the only important addition to Indonesian output since the end of the war . . . Shell continues as the country's largest producer but its North Sumatra properties remain in Indonesian local control . . . U. N. takes a hand in Indonesian-Dutch dispute over Netherlands New Guinea, recommending negotiations . . . Territory triples production with completion of new pipeline giving outlet for two new fields . . . Operating company, representing Caltex, Shell, and Standard-Vacuum, seeks new and better fields to recoup heavy investment made since the mid-30's . . . Shell companies in North Borneo hold production at 100,000 bbl. daily, with virtually all the oil coming from Seria field . . . Offshore platform drilling extends field into the sea . . . Territories under firm control of Britain and politically stable.

for petroleum operations arose in part from the general wave of nationalism which has swept across Asia during the last 10 years. In addition, considerable civil unrest occurred in Indonesia in 1949 when the new republic was created following the Dutch withdrawal

Shortly after the end of the war, the three concessionaire companies in Indonesia—Royal Dutch-Shell (through De Bataafsche Petroleum Mij.), Standard-Vacuum Oil Co., and Caltex, confirmed their so-called "let-alone" agreements with the government under which they were allowed to retain proceeds of foreign-exchange earnings for reconstruction of war-damaged facilities. The first of these agreements to expire was that with Standard-Vacuum which came to an end in 1951. Another expired at the beginning of 1954, and the third will end next year. New petroleum-industry investment in Indonesia has been held back because of the uncertain outlook. Indicative of the situation was the proposal which B.P.M. made publicly a year and a half ago. The company at that time offered to make large new investments over the next 10 years provided the government would guarantee security, return its properties in North Sumatra, and agree to a 50-50 division of profits with the company.

The middle of this year negotiations were under way between industry representatives and the government. The outcome of these meetings was described as being of crucial importance to the continued operation of the three companies in Indonesia. Informed officials were optimistic that a satisfactory arrangement will eventually emerge out of the discussions.

The company which later became the Royal Dutch Petroleum Co. now holding 60 per cent of the world-wide Royal Dutch-Shell Group originated in North Sumatra more than 60 years ago. Prewar this area had an output of about 22,000 bbl. daily and an 18,000 bbl. daily refinery. It suffered heavy war damage and much of the refinery was burned by extremists in 1947.

Shell has been denied access to North Sumatra since the end of the war. Small makeshift operations have been carried out by local Indonesian groups, and the region has been held by factions in virtual revolt against the government. The question of whether the properties should be returned to Shell has intermittently been a major political issue. Early this year, the government announced plans to place the oil properties under direct control of the

INDONESIA PRODUCTION

Borneo (Kalimantan)

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Anggana-Muara	1902	380-3,200	4	81	19		2,040	66,501,900	19.1-30.4	Miocene sd.
Balikpapan	1903	740-765						236,570	14.5	Miocene sd.
Bunju	1930	1,970-3,100	2		22	1	2,590	1,082,280	24.6-31.5	Pliocene sd.
Sambodja	1910	160-4,400	1	47			1,040	55,994,970	23.4-32.2	Miocene sd.
Sanga Sanga	1897	430-2,900	4	80	30		3,510	151,933,710	17.2-34.5	Miocene sd.
Sangatta	1940	1,640-4,200						1,150	36.0	Miocene sd.
Tandjung	1938	2,500-4,300	1		[1]23		[2]60	747,320	38.8	Eocene sd.
Tarakan	1906	195-2,400	4	458	1		4,780	173,409,820	18.3	Pliocene sd.
Total Borneo			16	666	95	1	14,020	449,907,720		

1. Field shut in, pipeline not available. 2. Production for company use.

Ceram

Bula Lemun	1897	240-920						8,203,000	23	Plio., Tri. sd.

Java

Kawengan	1926	1,750-2,700	3	68		1	10,980	57,261,700	33.3	Miocene sdy. ls.
Kruka	1929	970-1,600		51			690	8,280,580	27.4	Miocene ls.
Ledok	1896	320						21,299,790	43	Miocene sd.
Lidah Kulon	1896	490-1,330						33,369,000	24.5	Miocene ls.
Nglobo-Semanggi-Banjuasin	1897	370-3,350						18,604,190	43	Miocene sd.
Total Java			3	119		1	11,670	139,115,260		

SUMATRA

(Northern District)

Dj Rajeu	1929	2,520-2,590						559,000	54.5	Pliocene sd.
Gebang	1936	2,970-3,400						135,000	54	Miocene sd.
Pangkalan Susu	1917	1,550-2,100						6,287,000	56	Miocene sd.
Pase	1939	2,000						52,000	23-30	Tertiary sd.
Pulu Pandjang	1928	1,640-2,400						11,243,000	55.5	Miocene sd.
Perlak	1900	160-2,200						41,870,000	57	Miocene sd.
P. Tabuhan	1937	3,300-3,500						3,283,000	52.5	Miocene sd.
Rantau	1929	1,040-2,560						55,513,000	48.5	Miocene sd.
Serang Djaja	1926	3,560-4,150						7,551,000	64.5	Miocene sd.
Telaga Said D.K.G.	1893	210-720						23,621,000	51.5	Miocene sd.
Total Northern district								156,114,000		

(Central District)

Duri[1]	1940	730			6			[2]6,027		
Kotabatak	1952	4,800			2			[2]3,716		
Lirik-Sago	1941	1,800						577,940		
Minas	1944	2,460	71		46	2	40,500	27,706,368		
Pungut	1951	2,940				2		[2]200		
Sebanga[1]	1940	1,200			3			[2]2,369		
Total Central district			71		57	4	40,500	28,296,620		

1. Inactive since war with Japan. 2. Oil for company's use.

(Southern District)

Abab	1951	6,000	6				675	659,354	35	Tertiary ss.
Babat	1901	100-1,050	1	20			37	8,410,370	38.6	Miocene ss.
Badjubang	1927	2,700-3,300	9	12			2,540	30,652,580	47.5	Miocene ss.
Benakat	1933	1,600	51	82	2	1	10,000	59,400,667	38	Tertiary ss.
Betun	1951	6,500	5		2		970	2,194,526	35	Tertiary ss.
Betung[1]	1923	180-950							40.5	Miocene ss.
Djirak	1930	1,000	2	105	2		4,780	35,401,882	38	Tertiary ss.
Gunung Kemala	1938	6,070-6,250	14			1	7,560	6,702,820	36.3	Miocene ss.
Karang Ringing[1]	1903	160-1,200						1,510,110	42.5	Miocene ss.
Kenali Asam	1931	1,700-4,100	49	23	1	1	17,010	43,875,910	25.7-44.4	Miocene ss.
Kluang	1914	2,300-2,600						28,704,430	40	Miocene ss.
Kruh	1941	3,500		8	2		310	1,319,042	38	Tertiary ss.
Limau	1928	5,200-5,450	26	2			14,070	16,992,440	32.4	Miocene ss.
Mangundjaja	1935	660-2,200		49			2,020	14,160,010	24.4	Pliocene ss.
Meruo Senami[1]	1938	2,400-2,600						95,710	48	Miocene ss.
Muara Emin Complex	1903	300-1,150		3			30	28,659,620	45.6	Pliocene ss.
Prabumulih, West	1953	5,600	3			1	2,460	606,770	31.3	Miocene ss.
Radja	1941	7,000	22		5		4,620	6,910,232	40	Tertiary sd.
Setiti	1936	1,850-1,970							26	Miocene ss.
Suban Dierigi	1905	1,300-2,500		19			200	36,001,300	46.9	Plio., Mio. ss.
Talang A-P	1922	2,800	246	124	21	1	42,760	218,123,241	38	Tertiary ss.
Talang-Djimar	1937	3,600-4,200	50	26			20,640	73,519,630	28.2	Miocene ss.
Tandjung Tiga	1940	4,400-4,600	2	18		1	5,630	10,827,740	27.8	Miocene ss.
Tempino	1931	1,930-2,700	21	58			8,390	59,643,530	46.9	Miocene ss.
T. Luntar[1]	1912	2,200-2,800						4,312,090	56	Pliocene ss.
Total Southern district			507	549	35		144,702	679,684,004		

1. Inactive.

INDONESIA REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
N.V. de Bataafsche Petroleum Mij.:				
Balik Papan	50,000			
P. Brandan[1]				
Pladju	85,200		25,000	
Tjepu	4,600			
Wonokromo	3,200			
N.V. Standard-Vacuum Petroleum, Mij., Medan Merdeka Selantan 18, Kotak Pos 154, Djakarta, Djawa—Sungei-Gerong	71,000		34,500	Alky-800, V-25,500
Total Indonesia	214,000		59,500	

(1) Refinery now impossible to operate.

Ministry for Economic Affairs and to appoint a coordinator to manage the operations.

Indonesian production this year appears to have leveled off at around 220,000-230,000 bbl. daily, although up-to-date figures on the country's output are seldom available. In 1953, Indonesian crude production showed a 26 per cent increase over the previous year, rising to 217,300 bbl. daily. Nearly all of this was accounted for by the commencement of commercial operations from Minas field in Central Sumatra by Caltex (N.V. Caltex Pacific Petroleum Mij.). Production from this area has been at a rate of about 40,000 bbl. daily. Minas was discovered in a well drilled by Caltex just before the Japanese invasion.

Minas is the only addition to the list of major Indonesian producing fields since the end of the war. Reflecting the political uncertainty, Indonesia is one of the few large oil-producing countries which has failed to show a substantial increase in output in the postwar years. Besides output of Minas field, about 130,000 bbl. daily comes from a complex of fields in South Sumatra which are operated by Standard-Vacuum and B.P.M.

JAPAN

Area, sq. miles	**147,690**	**Value**	**$0.0028**
Population	**84,300,000**	**Refining cap., B/D**	**147,400**
Capital	**Tokyo**	**Reserves, bbl.**	**52,000,000**
Currency	**Yen**	**Production, B/D**	**5,700**
	Producing fields	**49**	

THE Japanese petroleum industry is suffering seriously from the country's general lack of foreign exchange. Because earnings abroad are insufficient to meet the overall requirements of the Japanese economy, imports of petroleum along with other needed raw materials have been curtailed. During the last year, leaders in the government have studied means of cutting back imports and consumption.

Japan was shored up by generous infusions of American-dollar assistance during the immediate postwar years. The inflow of dollars was prolonged by the heavy American expenditures in Japan during the Korean war. Since the peace agreement in Korea, however, Japan's economic position has become more and more difficult. The coun-

JAPAN PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Hachimori	1938	1,480	2	51	7	1	150	870,164	16	Miocene fluct. vol.
Yabase	1934	320-5,580	166	260	61	20	3,500	15,708,618	28-36	Miocene sand, tuff
Innai	1934	2,540		61	8		350	4,133,445	22.3	Mio. sand, tuff, sh.
Ishinazaka	1944	650	4	10	4		125	576,676	18	Pliocene sand
Niitsu	1896	410-4,270	2	649	31	2	425	18,671,492	18.6	Miocene tuff or sand
Higashiyama	1893	590-2,100		247	7		200	7,302,616	33.4	Miocene sand
Nishiyama	1897	1,050	1	178			120	12,349,197	37.4	Miocene sand
Others			3	1,938			830	34,492,705		
Total Japan			178	3,394	118	23	5,700	94,104,913		

JAPAN REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Daikyo Oil Co.—Yokkaichi	14,000			
Koa Oil Co.—Marifu	12,000	1,300	2,500	R-1,200
Marizen Oil Co.:				
Kudamatsu	11,000			
Matsuyama	5,000			
Mitsubishi Oil Co.—Kawasaki	16,000		2,500	R-1,500
Nihon Mining Co.—Funakawa	3,000			
Nippon Oil Co.:				
Tsuchizaki	4,000		850	
Niigata	2,000			
Kashiwazaki	1,400			
Nippon Pet. Ref. Co.:				
Yokohama	18,000			
Kudamatsu	8,500	1,200		R-9,000
Showa Oil Co.:				
Hirasawa	3,000			
Niigata	10,000			
Kawasaki	12,000	1,200		
Toa Nenryo Kogyo Co.:				
Shimizu	7,500			
Wakayama	20,000		3,200	R-4,700
Total Japan	147,400	3,700	9,050	

try has been cut off from some of its most important former markets such as China, and the industry and raw-materials sources it once controlled in Manchuria are gone. In the first half of 1954, Japan ran up a dollar deficit in its trading of $140,000,000.

In these circumstances, it has been natural for the government to attempt to reduce the drain caused by oil imports. Approximately 95 per cent of the country's oil requirements must be imported since domestic production is small and offers little hope of substantial increase. Japan has an active refining industry and by far the larger part of the imports are in the form of crude oil. Products imports amount to around 10 per cent of domestic consumption which this year is estimated to be around 140,000 bbl. daily, or 50 per cent over 1938. For the first half of the 1954 fiscal year, the government is allowing exchange which will permit the country's refineries to operate at about 125,000 bbl. daily. Among the expedients which have been considered to meet the shortage are barter agreements for petroleum, and a plan allowing foreign marketing companies to contribute an increase in capital to their Japanese associates by supplying crude oil.

Because of the lack of exchange to pay for imports, stocks in Japan have been varying between conditions of acute shortage to complete unavailability. The situation also explains the efforts of various Japanese marketing companies to obtain oil on a barter basis from Iran and from Soviet Russia.

Fuel Oil Consumption Encouraged

While Japan was able to pay for ample oil imports up until a year or two ago, residual fuel-oil consumption was officially encouraged because of the lack of good-quality cheap coal from the former sources in Manchuria, and labor and difficulties in the domestic coal industry. Now, however, the government is seeking to limit heavy-oil usage, and in line with this policy, decided this fall to prohibit use of heavy oil for cooking, heating, and water heating, to limit sales of each wholesaler, and to establish a heavy-oil demand-supply adjustment council.

Japan's own domestic oil production reached a peak of about 7,200 bbl. daily in 1940. Numerous small fields are operated in a belt extending down the coast in northwestern Honshu. After the war, American advisers with the occupation forces assisted the producing industry in a modernization of equipment and methods. Some secondary-recovery work was initiated, and output in the country has been relatively stable at around 6,000 bbl. daily. Production is dominant by Imperial Oil Co. which represents government and private Japanese interests. The company accounts for some 97 per cent of Japanese production.

Most of the larger Japanese refining and marketing companies have stock tieups with various foreign oil companies. These associations include: Mitsubishi and Tide Water Associated Oil Co.; Toa Nenryo and Standard-Vacuum Oil Co., Showa Oil Co. and Shell; Nippon Oil Co. and Caltex; Koa Oil Co. and Caltex; and Maruzen Oil Co. and Union Oil Co. of California.

NEW GUINEA

NETHERLANDS NEW GUINEA			
Area, sq. miles	159,375	Reserves, bbl.	115,000,000
Population	1,018,000	Production, B/D	11,400
Capital	Hollandia	Producing fields	3
PAPUA-NEW GUINEA (AUSTRALIAN)			
Area, sq. miles	183,540	Population	1,300,000

TWO separate petroleum operations are carried out in the difficult jungle and swamp country in New Guinea. In the western part of the island, which is under control of the Netherlands though claimed by Indonesia, small production has been developed, while in the eastern section which is held by Australia as the U. N. Provisional Administration of Papua-New Guinea, exploration is being continued in a costly program that was first commenced prior to World War II.

The operating company in Netherlands New Guinea is Nederlandsche Nieuw Guinee Petroleum Mij. (N.N.G.P.M.), owned 40 per cent by De Bataafsche Petroleum Mij. (Royal Dutch-Shell), 40 per cent by Standard-Vacuum Oil Co., and 20 per cent by Far Pacific Investments, Inc. (Standard Oil Co. of California and The Texas Co.). The company doing exploration in Australian New Guinea is Australasian Petroleum Co., Ltd., owned by Anglo-Iranian Oil Co., Ltd., through its exploration subsidiary, D'Arcy Petroleum Co., Ltd., Standard-Vacuum, and the Australian company, Oil Search, Ltd. Island Exploration Co., Ltd., is associated with Australasian and under the same control.

Pipeline Completed

Last spring, in Netherlands New Guinea, M.N.G.P.M. completed a 51-mile pipeline which allowed it to bring two additional fields, Wasian and Mogoi, on commercial production. This outlet will approximately treble the company's output to about 15,000 bbl. daily. Previously, the only production came from Klamono field in the western part of the Vogelkop. This field is connected to the coast and a terminal at Sorong by a 30-mile pipeline built in 1948.

Though exploratory work is continuing in Netherlands New Guinea, the output of these three relatively small fields provides the only concrete return thus far from a program that was commenced in the late '30's and which so far has cost the participating companies the equivalent of around $110,000,000. Exploration in the Vogelkop is nearing completion but several years more will be needed to drill the prospective areas that have been located.

The new pipeline from Wasian and Mogoi leads to a terminal on the mouth of the Muturi River. A section of the line through marshland is laid on a trestle of concrete piles. Frequent landslides caused by heavy rainfall were a major construction problem. Cost of the line and the associated facilities was about $6,500,000. Neither Wasian nor Mogoi is large, but the company hopes to develop other areas which can be connected into the line.

In Australian New Guinea, the Australasian program

NEW GUINEA PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Klamono	1936	300	1	19			4,836	9,603,230	18.9	Miocene limestone
Mogol	1940	1,300	4						46	Miocene limestone
Wasain	1940	2,900-3,250	11						48	Miocene limestone
Total New Guinea			16	5			12,946	9,603,230		

is handled by the D'Arcy company as operator. At Omati, the company last year drilled a test to 13,743 ft. to set a depth record for the Southern Hemisphere. The well was suspended after high-pressure gas caved the hole, freezing the pipe. Another well has been undertaken in this area and is reported also to have run into mechanical difficulties.

The Australasian program was resumed after the war, and up to the end of last year, seven holes aggregating 62,645 ft. had been drilled without the discovery of commercial production. The work this year was costing the equivalent of nearly $6,000,000, in addition to the more than $25,000,000 spent previously.

All movement through the country, if not by air or on the rivers, requires laboriously cut paths through the jungle. Helicopters have been introduced in the program, and have been found valuable in speeding up the progress of survey work. The company also uses flying boats, and a fleet of 10 vessels ranging from 20-ton river boats to 200-ton ocean-going ships.

BRITISH TERRITORIES OF BORNEO

North Borneo (British North Borneo, Brunei, and Sarawak)			
Area, sq. miles	81,726	Refining cap., B/D	47,300
Population	925,752	Crude reserves, bbl.	1,000,000
Currency	Dollar	Production, B/D	99,187
Value	$0.329	Producing fields	2

AN aggressive exploration program is being carried out by the Royal Dutch-Shell organization in the three territories that comprise British Borneo. As a result of the postwar development of Seria field, the area already is the largest oil producer in the British Commonwealth.

British Malayan Petroleum Co., Ltd., which operates in Brunei where Seria field is located, has been drilling for the last 2 years from offshore platforms in an effort to develop the seaward extension of this major producing area. Shows were obtained in the first test in 1953, and more recent reports indicate the company is about ready to begin commercial production from four later completions. The crude is to be moved through a submarine line to regular field tankage on shore.

The wells drilled thus far are located about a mile offshore in the South China Sea. Seria field adjoins the coast, and even before the war the company used wells drilled directionally and from jetties to reach into the submerged area. Two more platforms were under construction the latter part of this year. One unusual feature is the use of an aerial ropeway to transport supplies and personnel. These were constructed because of the frequent storms.

The British Malayan company also has had a deep test under way in Seria field itself which was slated to go to about 10,000 ft. to investigate formations underlying the present deepest production at about 7,000 ft. Other exploratory drilling has been under way in the area to the east of the field.

South of the Brunei Sultanate is the crown colony of Sarawak where another Royal Dutch-Shell company, Sarawak Oilfields, Ltd., operates the Lutong refinery and the old, virtually depleted Miri field (a 1911 discovery). Lutong is about 35 miles southwest of Seria and receives the output of this field for processing and export. Last spring, Sarawak Oilfields began posting export prices for Seria crude lifted from its terminal. The action was the first public crude-price posting in the Far East. The price announced for 37°-38°-gravity Seria crude, f.o.b. Lutong, was $2.60. In addition to its activities as a refiner and exporter, Sarawak Oilfields has been carrying out exploratory work in the territory with a well about 45 miles southwest of Miri in the Suai coastal section.

North of Brunei, in the Crown Colony of British Borneo, Shell Co. of North Borneo, Ltd., abandoned its Klias test at a depth of about 8,400 ft. There were no signs of production. This operation was undertaken in extremely difficult jungle country and necessitated expensive road construction. The company deferred consideration of any further drilling until additional geological and geophysical work could be completed. This same company has had gravity meter work under way in the Dent Peninsula on the east coast of the territory.

Last June, the British Government asserted jurisdiction over natural resources on the Continental Shelf bordering British Borneo. This step, following what has become an accepted practice among many nations of the world, left the "high seas" status of the waters outside territorial limits unaffected. The declaration, which was announced by the Colonial Office in London, protected Brunei's rights to the more distant submerged areas lying off its coast. The present offshore operations of British Malayan are within territory waters.

Large-scale public-developments programs are being carried out in Brunei and Sarawak. With the approval of the sultan of Brunei, this state has embarked on a 5-year plan of improving public services, agriculture, and communications.

BRITISH BORNEO PRODUCTION

British Borneo, State of Brunei

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data on prod. formation
Seria	1929	1,600-6,900	30	122	34	6	97,769	[1]267,008,243	19-38	Plio., Tri. sd.

1. Includes estimated oil produced by Japanese during wartime.

British Borneo, State of Sarawak

Miri	1911	300-3,050		159	284		1,418	[1]72,987,119	21.5-35.0	Tertiary sd.

1. Includes estimated production during Japanese occupation.

BRITISH BORNEO REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Sarawak Oilfields, Ltd., Miri, Sarawak—Lutong	47,300			

PAKISTAN

Area, sq. miles	350,000	Value	$0.3050
Population	75,687,000	Refining cap., B/D	4,000
Capital	Karachi	Reserves, bbl.	20,000,000
Currency	Rupee	Production, B/D	5,300
Producing fields		4	

CONTINUED exploratory work by two British oil companies in both East and West Pakistan has failed to uncover any new production since the discovery in 1952 of a major gas reserve at Sui in Baluchistan.

Pakistan Petroleum, Ltd., (majority owned by Burmah Oil Co., Ltd.) drilled unsuccessfully at Zin in West Pakistan and at Patiya in the separated eastern part of Pakistan. Zin, the latest of a series of P.P.L. deep tests, was suspended after the limestone which produced gas at Sui was found to contain only minor amounts of low-pressure gas. The company carried out seismograph work in the area of Uch, 33 miles south of Sui, and prepared to drill its next well at this location. In East Pakistan, P.P.L.'s Patiya well was abandoned at 10,176 ft. without sign of oil or gas. Despite this failure and also that of earlier drilling at Patharia, the company carried out gravity meter work over a large area in East Bengal and prepared to drill near Sylhet where detailed seismograph work was carried out. The company's next proposed area of exploratory operations in East Pakistan, after Syhlet, was farther west in the Mymensingh region.

High-Pressure Formations Slow Drilling

The other company, Attock Oil Co., Ltd., continued development of a deep zone at about 8,250 ft. in old Dhulian field, one of four which the company operates in the Potwar Basin of the Punjab in West Pakistan. The work was slowed by high-pressure formations. Production from the four fields, including an extension of Balkassar field operated by P.P.L., is running at a rate of about 4,800 bbl. daily. Attock's subsidiary, Pakistan Oilfields, Ltd., which carries on exploratory work outside the present producing area, undertook a second well at Bains in West Pakistan and made preparations for testing the Karsal area.

Despite the somewhat disappointing results obtained thus far in Pakistan, aside from the Sui gas discovery, American oil companies continued to show interest in the country. In September, Standard-Vacuum Oil Co. signed an agreement with Pakistan for exploration over 20,000 sq. miles in both East and West Pakistan.

The project for the utilization of the Sui gas reserves has moved forward rapidly. Construction commenced on a 350-mile, 16-in. line to move gas into Karachi for use by industrial consumers. The contract for laying the line was given to a joint company of Morrison-Knudsen, of Boise, Idaho, and William Press, Ltd., London.

The Sui gas line project promises to be of considerable economic benefit to Pakistan. It was estimated that the line would carry initially some 37 million cubic feet daily, and that the fuel value of the gas used in the first year of operations of the line would be equivalent to some 500,000 tons of coal. At present, fuel-short Pakistan imports 600,000 tons of coal, half its requirements, and more than 500,000 tons of fuel oil. Well-head pressures at Sui are sufficient to move up to 70 million cubic feet daily through the line without compression.

The pipeline is due to go into operation early next summer. Reserves in the Sui dome have been estimated at more than 2¼ trillion cubic feet, and indications were that this figure could be revised upward on the basis of the third well completed. At Sui, the second and third wells were 8 miles apart with the discovery in between.

The company building the pipeline is Sui Gas Transmission Co., Ltd. Equity capital is held by Pakistan Industrial Development Corp., public investors in Pakistan; Commonwealth Development Finance Co., and Burmah Oil Co., Ltd.

PHILIPPINES

RECENT petroleum developments in the Republic of the Philippines revolve mostly around the activities of the Caltex organization. This company, a major marketer in the islands, completed a new 13,000-bbl.-daily refinery the last half of this year, and during the summer became the first foreign company with exploratory interests in the Philippines when it took concessions over 500,000 hectares, or about 1,230,000 acres in northern Luzon.

The new Caltex refinery on Batangas Bay in southern Luzon, about 72 miles south of Manila, is the first to be built in the republic. Government and public leaders in the Philippines have long sought the construction of a domestic refinery, and the Caltex plant will meet roughly a third of the country's growing internal consumption of petroleum products.

The first tanker shipment of crude oil for the refinery was received at the new jetty in August. The shipment

PAKISTAN PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Balkassar	1946	8,000	6		2		[1]1,300		26	Eocene ls.
Dhulian	1937	7,700-8,300	21						35	Eocene ls.
Joyamair	1944	7,000	1		1				22	Eocene ls.
Khaur	1915								37	U. Tertiary ss
Total Pakistan			28		3		[2]5,519	3,114,900		

1. Total for Balkassar includes Pakistan Petroleum, Ltd., only. 2. Pakistan total includes Attock Oil Co., Ltd.

PAKISTAN REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Attock Oil Co., Ltd., 24-28 Lombard St., London E. C. 3, England—Rawal Pindi	4,000			

PHILIPPINES

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Caltex (Philippines), Inc., 91 Plaza Moraga, Manila—Batangas	13,000	5,400		P-560, V-7,500

came from Sumatra, but the design of the process facilities permits use of crude from a variety of sources. Foster Wheeler Corp. has the prime contract for construction of the refinery.

The refinery, which is owned by the subsidiary Caltex (Philippines) Inc., and was erected under an agreement made by the company with the government under terms of the Philippine Petroleum Act of 1949. This legislation imposes a modified refinery obligation on a concessionaire who finds domestic production. Facilities at the refinery include a 5,400-bbl.-daily fluid catalytic cracking unit and 565 bbl. daily capacity in phosphoric acid catalytic polymerization. There also is a propane decarbonizing unit. Cost of the plant was about $30,000,000.

The concessions taken by the company are in a region about which there is little detailed geological information. Intermittent exploration has been conducted in the country and several wells drilled by the locally owned Philippine Oil Development Co. This firm had some long-pending applications with the government on part of the area covered by the Caltex grants. These, however, had never been officially confirmed. Standard-Vacuum Oil Co., also a major marketer in the country, applied for exploratory acreage in the area but its filings duplicated those of Caltex and the unconfirmed applications of Philippine Oil Development. The Caltex exploratory program is handled by the affiliated American Overseas Petroleum, Ltd.

AUSTRALIA

Area, sq. miles	**2,974,581**	**Capital**	**Canberra**
Population	**8,431,000**	**Currency**	**Pound**
Value		**$2.26**	

DEVELOPMENTS the latter part of this year took the bloom off the Australian oil play. The deflationary news came during the summer when West Australian Petroleum Pty., Ltd., (WAPET) failed to find production in its second well drilled on the Rough Range structure in the Exmouth Gulf area some 700 miles north of Perth. Even more discouraging was the fact that a third well on this structure and the first test of the nearby but much larger Cape Range feature both also turned out to be dry. These results indicated that what production exists in these West Australian structures will be much harder to find than originally believed since the subsurface apparently bears little relation to the surface.

The original Rough Range discovery was the first ever made on the Australian Continent. The excitement of this well, producing around 550 bbl. daily of a waxy, high-pour-point crude from basal Cretaceous formations just below 3,600 ft., touched off the wildest speculation seen in the industry in many years. Australian interests promoted and issued stock in local oil companies, in some cases completely lacking any prospective acreage. Oil stocks rose to the point where high government officials urged the public to exercise restraint.

The geological opinion which led to the Rough Range discovery is credited to Frank Morgan, former chief geologist for Richfield Oil Corp., who investigated the area several years ago. Richfield, then interested in the Cuyama Valley development, failed to take up the West Australian prospect. The Australian firm, Ampol, acquired the acreage and took a 20 per cent interest in the WAPET company with the Caltex organization holding the majority 80 per cent share. Morgan this summer joined Ampol Exploration Co., Ltd., as chief geologist.

Along with the various Australian companies which quickly launched themselves in the oil business were several large and well-financed operators. One of these was Frome-Broken Hill Co., Ltd., in which Anglo-Iranian Oil Co., Ltd., and Standard-Vacuum Oil Co. are interested. Exploration by this company was reactivated following the WAPET strike, and large blocks of acreage taken in northern Queensland and the Northern Territory. Frome-Broken Hill also joined with local Australian companies to carry out work in Southeast Victoria. The Shell Co. of Australia took a 75 per cent interest in a joint venture with Australian mining companies and announced plans to carry on oil exploration when suitable acreage become available. In West Australia, practically all the sedimentary area was covered by the 340,000 sq. miles of WAPET permits, but the company was expected to relinquish some of its holdings when the permits came up for renewal the latter part of this year.

In Eastern Australia, Gene Goff, a Tulsa independent operator, was preparing to test the Maryborough area along the Queensland coast. Goff holds controlling interest in Lucky Strike Drilling Co. which obtained the concession about 2 years ago.

Meanwhile, one new refinery was opened in Australia, and construction work continued on three others. Together, these new plants will raise Australia's refining industry from a minor status to one with a total throughput of around 140,000 bbl. daily. Consumption this year in Australia is estimated at about 130,000 bbl. daily on a crude equivalent basis, so the industry will be able to

AUSTRALIA REFINING

Company and address—Refinery location—	Barrels per stream day—Crude distillation	Cat. cracking	Thermal operations	Special processing
Australian Oil Refining, Ltd., Box 3929 G.P.O., Sydney—Kurnell	[1]22,000	13,000		P-1,450, V-13,900
Australasian Petroleum Refinery, Ltd., Box 131, Fremantle—Kwinana	[2]70,000	12,500		[3]11,600, V-24,000 [4]A-20,000
Bitumen & Oil Refineries (Australia), Ltd., P. O. Box 1, Matraville—Matraville	[5]6,500			[3]1,400, [4]A-50,000, [3]Hydro-2,300
Commonwealth Oil Refineries, Ltd., 90 William St., Melbourne—Laverton	4,200			
The Shell Co. of Australia, Ltd., Melbourne:				
Clyde	8,400			
Geelong	36,000			
Standard-Vacuum Refining Co., Ltd., P.O. Box 4054 G.P.O., Melbourne—Altona	[6]2,200	[7]9,200	[7]5,200	L-670, V-2,200, A-550
Total Australia	149,300	34,700	5,200	

(1) Refinery due on stream in 1955. (2) Refinery due on stream in 1955. Atmospheric distillation includes two 35,000-bbl. units. (3) Includes 6,000-bbl. Platformer and 5,600-bbl. Hydrofiner. (4) Tons per year. (5) 10,000-bbl. atmospheric distillation unit to be added in 1955; 900-bbl. Platformer and 2,300-bbl. catalytic hydrogenation also to be added. (6) 27,000 bbl. to be added in 1955. (7) Catalytic cracker and reformer planned for 1955.

meet domestic needs for major products. Consumption in Australia is growing rapidly, but the usual history of refining operations is that even newly built plants expand to keep abreast of demand.

The new Shell refinery at Geelong near Melbourne went on stream the early part of this year. This is a 28,000-bbl.-daily plant connected to Melbourne by pipeline. A catalytic cracking unit and polymerization plant is being added in the second stage of construction now under way. Largest of the new Australian refineries is the 70,000-bbl.-daily project of Anglo-Iranian Oil Co., Ltd., near Fremantle in Western Australia. These facilities are to be brought into initial operation the early part of 1955. The Caltex organization is building a new 22,000-bbl.-daily refinery near Kurnell, and Standard-Vacuum Refining Co., Ltd., has a 27,000-bbl.-daily refinery under construction at Altona near Melbourne. Standard-Vacuum is adding a sulfuric acid alkylation unit to this project.

South America

ARGENTINA

Area, sq. miles	1,078,769	Peso, free rate	$0.0724
Population	17,641,000	Refining cap., B/D	186,100
Capital	Buenos Aires	Production, B/D	79,500
Currency	Peso	Reserves, bbl.	410,000,000

THE principal result of Argentina's recent effort to attract foreign capital into its oil industry were the negotiations under way this summer between Floyd Odlum, United States financier and head of Atlas Corp., and the Argentine Government. Several large foreign oil companies studied the prospects of new investment in Argentina but none of them had apparently submitted a firm proposal on the terms indicated by Argentina. Among the companies showing an interest in Argentina were Standard Oil Co. of California, Standard Oil Co. (N.J.), Shell, and The Texas Co.

Odlum in June offered Argentina a work-and-service contract involving field development and pipeline construction. It had some of the features of the usual concession contract, but in conformity with Argentine policy, the government retained title to all production. The original work which led to the Odlum offer was done earlier by officials of Dresser Industries who visited the country and discussed the question with the government.

Odlum proposed first to develop some of the Neuquen fields on behalf of the government organization, Yacimientos Petroliferos Fiscales, and to build and operate a 16-in., 370-mile crude line from Neuquen to the port of Bahia Blanca. The contract had a 25-year term with provisions for recovering the capital investment to be

ARGENTINA PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Number of wells: Pumping	Number of wells: Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Prod. in bbl.: Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Principal prod. districts										
Caleta										
Comodoro Rivadavia										
Mendoza										
Neuquen										
Salta										
Total Argentina			5	1,280			79,500	550,292,000		

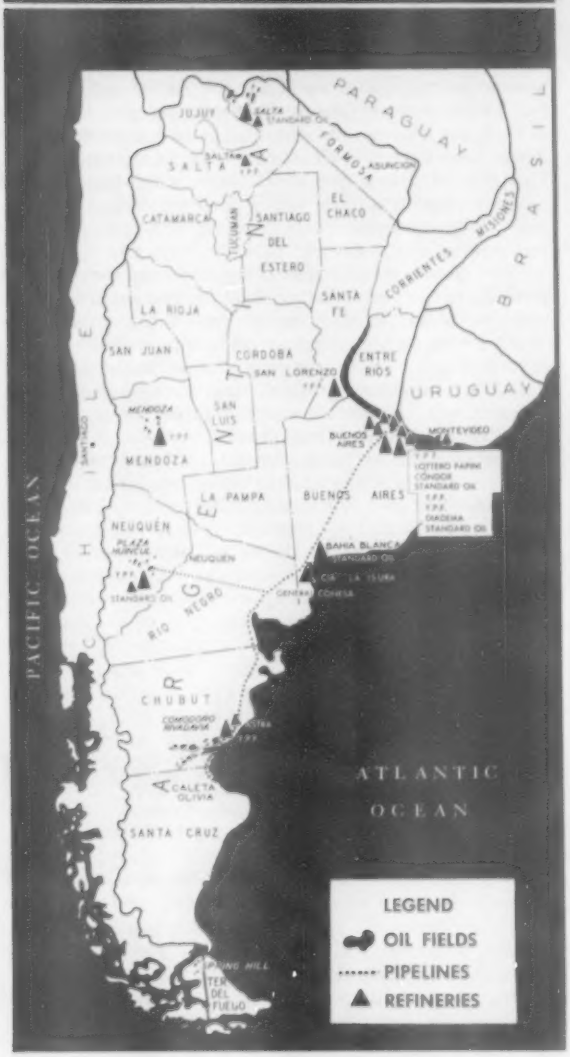
1. Due to government censorship, figures are estimates.

ARGENTINA REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Cia. Condor, Levalle 27, Avellaneda—Avellaneda	900			
Cia. La Isura, S.A. Ave. Pte., Pena 699, Buenos Aires—Bahia Blanca	2,000		1,000	
Diadema Argentina, S. A. de Petroleo, Roque 788, Saenz Pena, Buenos Aires—Buenos Aires	18,000		12,000	
Esso, S.A.P.A., S.A. Avda, Roque Saenz Pena, 567, Buenos Aires:				
Bahia Blanca	5,500		2,750	
Campana	25,000		11,000	
Dadin (Plaza Huincul)	500			
Manuel Elordi	1,300			
Lottero y Papini, Avellaneda—Avellaneda	600			
Ramon Gorleri, Quilmes—Quilmes	1,500			
Yacimientos Petroliferos Fiscales, Avda. Roque Saenz Pena 777, Buenos Aires:				
Avellaneda	6,000		2,500	
La Plata (Eva Peron)	95,000		25,000	
Lujan de Cuyo	5,000		3,000	
Plaza Huincul	1,300			
Comodoro Rivadavia	5,500		2,000	
Salta	2,000			
San Lorenzo	16,000		6,200	
Total Argentina[1]	186,100		65,450	

(1) Partly estimated.

ARGENTINA



Will Argentina come to terms with foreign operators on exploration and development deals? . . . Question still unanswered as year's end approached . . . Government presumably considering September offer by Floyd Odlum . . . Other proposals made by Standard of California, and earlier by Shell and Jersey Standard . . . Steps toward admitting private foreign oil capital apparently run into strong nationalistic opposition . . . Country badly in need of outside help in developing oil resources . . . Y.P.F. hampered by lack of money

made by Odlum's company, Petroargentina, plus profit.

The government raised objections to some features of the offer. It was apparent some in the government felt the proposal allowed too great a degree of control to foreign investors. In September, Odlum submitted a revised offer which provided that the Neuquen-Bahia Blanca line would be built for the government and restricted the field development to work outside existing producing areas. At the same time, Odlum proposed a uranium-mining agreement and a plan whereby he would take over and use blocked pesos of United States companies in Argentina.

Eventual acceptance of the Odlum proposal is uncertain. Even if it is agreed to by the government, it must be submitted to the Argentine Congress. Despite the severe economic difficulties of the country, arising in part out of heavy expenditures for imported oil, nationalistic feeling is still strong, and opposition is likely to any move which could be interpreted as turning over the country's oil resources to foreign operators. Some of this opposition is expected to come from elements in Y.P.F. which has long held a virtual monopoly over exploration and development.

Oil production in Argentina this year will average about 75,000 bbl. daily, little changed from the level of last year. About 60 rigs are in operation in the country, most of them in the old Comodoro Rivadavia field. Y.P.F.'s main trouble has been a lack of capital. This, coupled with a shortage of exchange permitting the necessary equipment purchases, has seriously retarded exploratory work in the large areas of the country which are regarded as possible of oil production. The two most important field discoveries, Campo Duran and Madre Jones, both are reported to be closed in.

Foreign Companies Denied Acreage

About one-fifth of Argentina's total production comes from operations of two foreign companies, affiliates of Shell and Jersey Standard, and four smaller Argentine-owned companies. However, these companies have been prohibited since 1935 from acquiring any additional acreage, and since they have done no drilling, their proportion of the total production has been gradually dropping. Besides Y.P.F., the government's operations also are carried on through Petroquinica, a smaller organization which handles separately the oil properties acquired in 1948 from the British National Railways of Argentina (Cia. Ferrocarrilera de Petroleo).

Argentina's growing petroleum consumption, in the face of a stationary or only slightly increasing production, has required steadily larger imports. Imports now supply around 45 per cent of total domestic demand. Argentina has placed heavy dependence on oil as a source of energy for its industrialization program, and expenditures on liquid fuels make up about 15 per cent of the country's total import bill.

The main activity on the refining side of the Argentine industry in the last several years has been the construction of Y.P.F.'s new Presidente Peron refinery at Eva Peron (formerly La Plata). The first unit of this refinery was to be placed in operation in October, with the entire refinery on stream by the end of the year. This 28,300-bbl.-daily plant includes fluid catalytic cracking, alkylation, and a large delayed-coking unit.

About three-fourths of Argentina's oil imports are derived from British sources and are paid in sterling. These imports have been made under a succession of trade agreements between Argentina and Britain, the first of which was concluded about 5 years ago. In the summer of 1953, Argentina negotiated a trade agreement with Soviet Russia, and the first shipment of Russian oil, consisting of gas oil, and gasoline from Batum on the Black Sea, was received by Argentina in February of this year.

BOLIVIA

Area, sq. miles	416,040	Value	$0.0055
Population	3,054,000	Refining cap., B/D	12,340
Capital	La Paz	Production, B/D	4,500
Currency	Boliviano	Number of fields	4
Reserves, bbl.		45,000,000	

OIL operations in Bolivia are controlled by the state company, Yacimientos Petroliferos Fiscales Bolivianos. Prior to 1937, Standard Oil Co. (N.J.) held a concession in Bolivia but in that year its properties, including Camiri field in the southeastern part of the country, were nationalized. In 1942, Bolivia paid the company $1,750,000 as compensation. After the war, Bolivia obtained Export-Import bank loans and built up refining capacity at Sucre and Cochabamba to about 9,000 bbl. These plans were connected with Camiri with one of the world's highest pipelines, a system that in places reaches an altitude of 10,000 ft.

For several years, Bolivia lacked sufficient production to utilize but a small part of the capacity of these facilities. Output ranged at around 1,300 bbl. daily in comparison to a domestic consumption in the 4,000-bbl. daily range. In 1951, the government relaxed its state-monopoly policy and opened up parts of the country to foreign operations. The result of this more liberal policy was a concession contract signed the early part of 1953 with Glenn McCarthy, Houston. None of the large foreign oil companies accepted Bolivia's invitation. Their lack of interest in the country apparently was compounded of several factors, the geological prospects, lack of ready access of the seaboard and export markets, Bolivia's own record of occasional political instability, and the terms offered by the government for acreage.

The McCarthy contract, through which this well-known Texas independent hoped to recover from his financial difficulties, contained definite drilling obligations in the two areas covered, Los Monos and Agua Salada in the Gran Chaco near the Argentine border. Up to the fall of this year, he had put down two wells in Los Monos. The first produced a small amount of high-gravity oil, and the second was reported to have tested around 100 bbl. daily. Both produced large volumes of gas. Meeting terms of his agreement with the government, McCarthy moved in a second rig and was preparing to extend his activities to the other area, Agua Salada.

While McCarthy was getting under way with his operations, Y.P.F.B. found oil in a deeper zone in Camiri field. Subsequent development which has continued this year brought a sharp increase in production to around 4,000 bbl. daily. Estimates are that Y.P.F.B.'s fields have a potential of about 7,000 bbl. daily, and the latter part of the year the agency let a contract to a subsidiary of Williams Brothers for construction of a pipeline leading south from Camiri to Yacuiba on the Argentine border. This line will allow export of about 3,000 bbl. daily of crude to Argentina. The sale of Bolivian crude to Argentina was provided in a trade government negotiated earlier between the two countries.

The discovery and development of the new Camiri production has considerably improved the petroleum outlook in Bolivia. During the spring, six rotaries and one spudder were in operation in the country. With the improved supply, small sales were being made in border regions of neighboring Brazil and Paraguay. Williams Brothers was engaged to make a survey of a proposed Cochabamba-Oruro-La Paz pipeline.

The plan was to build a branch off this system to the Pacific Coast in Chile and to make oil export sales in this country. Latin American Exploration Co. was contracted to carry out seismograph work in eastern Bolivia in the area east of Santa Cruz de la Sierra, and Y.P.F.B.'s general manager, Eduardo Tinojosa Acha, announced that the government was studying the possibility of further developing old Bermejo field.

BRAZIL

Area, sq. miles	3,288,000	Value, free rate	$0.0158
Population	52,619,000	Refining cap., B/D	105,800
Capital	Rio de Janeiro	Production, B/D	2,600
Currency	Cruzeiro	Number of fields	10
Reserves, bbl.		60,000,000	

OIL operations in Brazil, except for distribution, are controlled by Petróleo Brasileiro S.A. (Petrobrás) the government-sponsored corporation which was organized in 1953 to take over the oil activities of another state organization, the Conselho Nacional do Petróleo.

The funds to finance Petrobrás are provided by taxes on imports of petroleum products and new excise levies on automobiles, aircraft, boats, etc.

BOLIVIA PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Camiri	1926	3,000	19	3	22	4	4,944	4,654,774	53	Devonian sand
Guairuy	1946	2,000	1			1	59	81,110		Devonian sand
Sanandita	1926	2,200		11	5		150	1,927,201	42	Permian sand
Bermejo	1922	3,300		7	1	1	209	1,225,104	26	Permian sand
Total Bolivia			20	21	28	6	5,362	7,888,189		

BOLIVIA REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Yacimientos Petroliferos Fiscales Bolivianos, Ave. Gral. Camacho, La Paz:				
Camiri	1,450			
Cochabamba	5,850			
Sanandita	410			
Sucre	[1]4,630			
Total Bolivia	12,340			

(1) Two units, one of 1,100-bbl. capacity, one of 3,530-bbl. capacity.

The capital generated within Brazil for Petrobrás runs into many millions of cruzeiros, but the great problem to the country's already strained economy has been to find foreign exchange for the necessary and technical services.

Petrobrás represents the government monopoly for all exploration, development, refining, and transportation of Brazilian oil.

Under terms of the Petrobrás bill, the private refineries now existing cannot expand their capacity, and their stock may be bought by Petrobrás to convert them into subsidiaries in which the government company must hold at least 51 per cent.

Petrobrás is continuing a steady program of exploration and development in the Reconcavo area in Bahia and in the valleys of Amazon and Paraná rivers.

Brazil's domestic production, all from a group of 10 fields developed by C.N.P., so far meets only a fraction of domestic consumption which this year is estimated to average about 140,000 bbl. daily.

Brazil's oil requirements are rising at a rate of some 10 per cent a year, and the output of the Bahia fields amounts to around 3,550 bbl. daily.

Brazil's present refining capacity is 87,300 bbl. daily. The principal refinery is the 45,000-bbl.-daily Cubatao plant at Sao Paulo, which is processing two kinds of crude: a Tia Juana Recon crude from Venezuela and a stabilized Arabian crude from Abqaiq.

Petrobrás is also interested in the petrochemical industries. An ammonia plant is being built close to the Cubatao refinery, to produce 100 short tons per day of ammonia and 1,000,000 standard cubic feet per day of hydrogen.

Also, nitric acid will be produced in this plant to make a granular ammonium nitrate.

The asphalt plant, construction of which will be completed at November 1955, is the result of special agreement between Petrobrás and Standard Oil Co. of California and will process Boscan crude to produce 116,000 tons per year of penetration asphalts.

CHILE

Area, sq. miles	286,396	Value, free rate	$0.0033
Population	5,916,000	Refining cap., B/D	20,000
Capital	Santiago	Production, B/D	4,600
Currency	Peso	Number of fields	12
Reserves, bbl.		55,000,000	

THE possibility that Chile may turn its back on state-monopoly oil policy arose the latter part of this year. In a surprise move, the Chilean cabinet, which was appointed by the president in June, voted to allow private foreign companies to participate in exploration and development in the country. The matter was referred to the minister of mines who was instructed to draft legislation to implement the cabinet's decision.

If Chile relaxes its government oil monopoly, it will become the latest in a growing list of countries that have liberalized their petroleum laws in the last few years to attract a greater inflow of foreign capital. Some officials in the industry adopted a wait-and-see attitude on the new Chilean plans. They pointed out that the step would represent a far-reaching reversal of policy in Chile, and that the congress would need to approve whatever changes were made in the law. The crucial question in cases of this kind is the contract terms which the government offers to the foreign oil companies.

Exploration and production in Chile have been a state monopoly since 1928. Petroleum activities prior to 1950 were handled by government's Corporacion de Fomento (CORFO), and since then by the subsidiary Empresa Nacional de Petroleo (ENAP). Using American geophysicists and geologists under contract and with drilling contracted to an American firm, Corfo made its initial discovery in 1945 on the Manantiales structure in Tierra del Fuego on the southern tip of the country. Commercial production was begun in 1949. There are now some 17 separate fields, some of them apparently quite small and others largely undeveloped. The production of about 4,500

BRAZIL PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data on prod. formation
Agua Grande	1950	1,280	10	6		2			37	Cretaceous ss.
Aratu	1941	800		2					50	Cretaceous ss.
Candeias	1941	1,000	20	52		2	2,195		32	Cretaceous ss.
Dom Joao	1947	350	20	85	1	1	1,152		38	Cretaceous ss.
Itaparica	1941	800		25			173		30	Cretaceous ss.
Lobato-Joanes	1939	750		4					31	Cretaceous ss.
Mata Sao Joao	1953	3,800		10		1			33	Cretaceous ss.
Paramirim	1950	1,200		2			33		35	Cretaceous ss.
Pedras	1951	250	1	11		1			41	Cretaceous ss.
Pojuca Central	1953	4,700		2					38	Cretaceous ss.
Total Brazil			51	199		8	3,553	4,060,747		

BRAZIL REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	—Special processing—
Cia. de Petroleo da Amazonia, S.A.—Manaus	5,000	2,500		
Destilaria Rio Grandense de Petroleo—Uruguaiana[1]	300			
Industrias Matarazzo de Energia—Sao Paulo	1,000			
"Ipiranga" S.A. Rio Grande do Sul—Rio Grande	6,000		2,000	
Refinaria de Manguinhos S.A.—Rio de Janeiro	10,000		7,000	
Refinaria Uniao S.A.—Capuava	20,000	10,000		
Petrobras S.A.—Mataripe[2]	15,000	7,200	2,500	
Petrobras S.A.—Cubatao	45,000		18,000	
Petrobras S.A. (Fabrica de Asfalto)[3]—Cubatao	3,500			
Total Brazil	105,800	19,700	29,500	

(1) Operated by "Ipiranga." (2) Assuming the new project for manufacturing of lube oils to be placed in service in 1956. (3) New refinery to be placed in service in 1955.

bbl. daily comes from eight of the fields, principally Sombrero.

ENAP maintains an active drilling and development program. It has been using six rigs on exploration and development and is preparing to drill at Salar Pedernales in Atacama Province in Central Chile. During the first half of this year, ENAP completed nine exploratory wells, six dry, two gas, and one oil producer, for a total footage of 49,619 ft. Development wells during the first half numbered seven, three of them oil producers and four dry, for 46,309 ft. During the second half of the year, ENAP programed 10 exploratory wells for 67,700 ft. total, and 11 development wells for 79,900 ft., a total footage for both types of wells of 147,600 ft. If this is realized, it will be about half again as much as was drilled during the first half of the year.

The principal petroleum industry project in Chile during the year was the completion and final opening of the country's first large-size refinery. It was built at Concon about 10 miles north and east of Valparaiso by the ENAP organization. M. W. Kellogg Co. handled design, engineering, and supervision of erection.

The refinery has a capacity of 20,000 bbl. daily and includes 4,520 bbl. daily in thermal cracking, 4,960 bbl. daily in visbreaking, and 3,970 bbl. daily in reforming. As a part of the refinery project, ENAP is building a system of pipelines which will move products from the refinery. The first lines to be built go to Salinas near Valparaiso. Later, refinery gas and products are to be moved through two 80-mile lines to Santiago. About half the crude oil for the refinery will be supplied from Venezuela (Oficina) by the Esso organization. Other charge for the plant will be delivered from the Magallanes fields by ENAP. Previously this domestic production was sold to Uruguay, and the funds used to assist in construction of the refinery.

In Chile's case, it is again the lack of capital which is encouraging a change in the official policy on oil development. The capital requirements for oil operations has been a heavy drain on the country's treasury, a drain which the government apparently feel can be avoided by inviting in the foreign oil companies.

COLOMBIA

Area, sq. miles	439,997	Value	$0.4020
Population	11,260,000	Refining cap., B/D	39,500
Capital	Bogota	Production, B/D	109,400
Currency	Peso	Number of fields	18
Reserves, bbl.		570,000,000	

THE most noteworthy activity in Colombia over the past year has been principally in the fields of refining and pipeline construction. Additional products lines have been laid, work continued on a 119-mile crude line, a $44,000,000 expansion program completed at Barrancabermeja, and plans announced for erection of a new 25,000-bbl.-daily refinery on the Caribbean Coast.

The new crude-oil line is being built by Foster Wheeler Corp. through Panama-Williams for Texas Petroleum Co. It extends from Texas' Velasquez field north down the Magdalena River to a connection with the Andian National system at Galan. Texas Petroleum discovered Velasquez on fee-held property in 1945 and subsequent development work has revealed a field of possibly 200,000,000 bbl. reserves. Its present production of slightly over 5,000 bbl. daily goes through a short line for refining at the La Dorada topping plant of International Petroleum Co. (Colombia), Ltd.

The products pipeline system in Colombia consists mainly of lines leading out of the mid-Magdalena Valley refinery of Empresa Colombiana de Petroleos at Barrancabermeja. Two years ago, a 6⅝-in. line was laid over the mountains from the Magdalena River port of Salgar to Bogota. Work this year has completed linking Salgar with the refinery. This last section of this 8⅝-in. line was built by Anderson Brothers from Barrancabermeja to Cantimplora and completed the latter part of this year. Another newly built line leads from Cantimplora to Medellin, a major industrial city in Colombia. In addition to this network from Barrancabermeja, another project calls for a 75-mile products line from the Pacific Coast port of Buenaventure to Cali. The products lines in Colombia are owned by the state governments and Empresa Colombiana de Petroleos E.C.P., and in some cases,

CHILE PRODUCTION

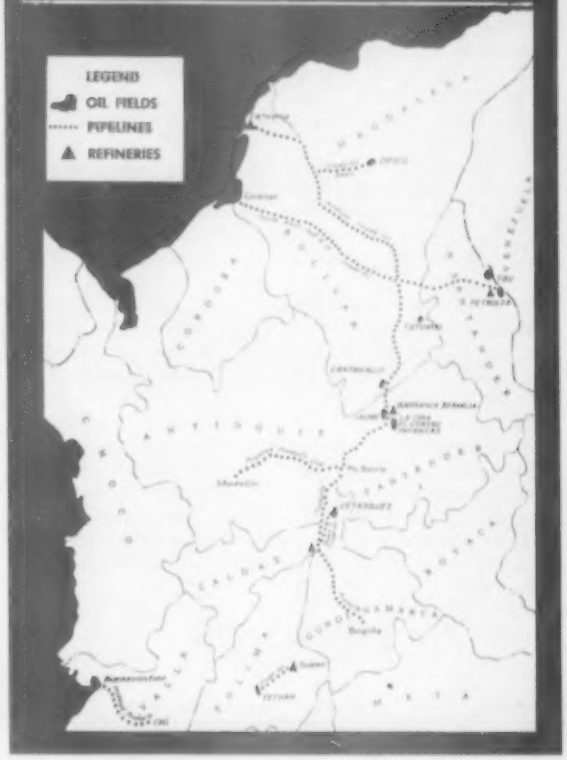
Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Angostura	1950	7,500			1			5,169	39	U. Cretaceous ss.
Chanarcillo	1950	7,600	1		2		273	236,139	46	U. Cretaceous ss.
Chanarcillo Sur	1952	7,500	1				99	26,145	46	U. Cretaceous ss.
Chillan	1953	7,600	1		3		308	110,528	41	U. Cretaceous ss.
Delgado	1951	7,600			3			1,567	39	U. Cretaceous ss.
Espora	1949	7,500			1			4,490	46	U. Cretaceous ss.
Manantiales	1945	7,500	9		14		390	953,281	42	U. Cretaceous ss.
Manzano	1953	4,000-5,000			4					Miocene sd.
Primavera	1954	7,600			1					U. Cretaceous ss.
Punta Baja	1952	7,900			2			222		U. Cretaceous ss.
Sara	1953	7,700			1			385	46	U. Cretaceous ss.
Side	1953	7,100			1		11	5,322	42	U. Cretaceous ss.
Sombrero	1950	7,500	5		11	1	2,062	1,638,829	42	U. Cretaceous ss.
Victoria Este	1954	7,500			1			238	46	U. Cretaceous ss.
Victoria Norte	1950	7,600	2		3	1	518	231,568	42	U. Cretaceous ss.
Victoria Oeste	1954	7,700			2					U. Cretaceous ss.
Victoria Sur	1950	7,500	4		13	1	851	1,211,037	42	U. Cretaceous ss.
Total Chile			23		63	3	4,512	4,424,920		

CHILE REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Empresa Nacional del Petroleo, Ramon Nieto 920, Santiago—Concon[1]	20,000		13,450	

(1) Under construction.

COLOMBIA



Colombian reserves rise substantially with steady, successful development of Velasquez field by Texaco subsidiary . . . Field now ranked as Colombia's largest . . . Intercol makes as-yet unevaluated discovery at Cayman south of Totumal where development and testing continues . . . Continuous products pipeline system completed from Barrancabermeja to Bogota . . . Large, new, modernized refinery opened at Barrancabermeja . . . Plans firmed for construction of new 25,000-bbl.-daily refinery on Caribbean Coast

International Petroleum (Colombia) (Intercol) whose subsidiary, Esso Colombiana, S.A., is the dominant marketer in Colombia, has assisted with the financing.

The Barrancabermeja refinery is the only large processing installation in Colombia. The facilities, along with the De Mares producing property where the refinery is located, were acquired in 1951 by E.C.P., the then newly organized government company, at the expiration of the concession term of the old Tropical Oil Co. Since then, the refinery has been operated under lease by Intercol, one of the successor companies to Tropical.

Last August, official dedication ceremonies were held to mark the completion of a major modernization and expansion program at Barrancabermeja. Capacity has been raised to 37,250 bbl. daily. Besides a distillation unit, other new facilities include a 15,130-bbl.-daily fluid catalytic cracking unit, 16,500-bbl.-daily visbreaker, 1,200-bbl.-daily sulfuric acid alkylation, and 300-bbl.-daily capacity for the production of lubricating oils. The plant now ranks as one of the most up-to-date refineries in South America. It has been estimated that its first full year of operation in 1955 will result in a savings to the country in the cost of imported white products of nearly $21,000,000.

Coast Depends on Imports

The Barrancabermeja refinery serves the interior of the country, including the capital at Bogota. The Pacific Coast, which is separated from the Magdalena Valley by a mountain barrier, depends on imported products for its petroleum supplies. Since Colombia is a large net exporter of crude oil, Colombian leaders have long sought to rectify this situation by promoting the contsruction of an entirely new refinery on the Caribbean Coast. Intercol has announced its intention to build such a refinery of 25,000-bbl.-daily capacity, probably near Cartagena. Cartagena is near the terminal of the Andian National line, and the refinery would operate on domestic crude. It is expected to be in operation by the end of 1957.

Colombian production has shown little change during the last 3 years. It will be stepped up somewhat in 1955 when Texas Petroleum begins moving Velasquez crude into the Andian line. A production of around 30,000 bbl. daily is predicted from this field in 1956. It is to Velasquez that Colombia must look as the proved oil source to offset declines in the older fields. De Mares, where the government company has earmarked 20 per cent of

COLOMBIA PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Buturama	1953	6,000	3				(1)		38	Cretaceous limestone
Cantagallo	1942	4,250-7,660	7	1			2,196	3,034,171	21.1	Eocene sand
Carbonera	1939	1,500-1,985		2			50	220,121	21-39	Eocene sandstone
Casabe	1941	2,140-5,660	11	339			41,057	80,469,591	20.9	Mio., Eoc., Olig. sd.
Colorado	1930	3,400-4,200	5		9		240	708,623	28	Eoc., Olig. ss.
El Dificil	1943	5,500-5,800	16		4		1,085	5,030,112	43	Oligocene limestone
Galan	1945	3,800-4,050		4	1	1	250	493,472	20	Eocene, Olig. ss.
Infantas	1915	300-3,600		250	182	2	8,000	169,021,650	26	Eocene, Olig. ss.
La Cira	1926	200-4,300	4	738	124	5	27,250	312,042,100	24	Eocene, Olig. ss.
Ortega	1951	5,300							28.6	Cretaceous limestone
Petrolea	1933	700-1,320	14	5	40		450	31,871,341	46	Cretaceous ls., ss.
Rio de Oro	1920	8,300	7	2	1	1	500	726,452	50	Cretaceous ls., ss.
Sardinata	1950	9,400	3				750	944,603	45	Cretaceous ls., ss.
Tetuan	1949	2,700						21,532	21.4	Cretaceous ls., ss.
Tibu (heavy)	1940	4,300	51	123	13	2	17,250	51,623,420	32	Cretaceous limestone
Tibu (light)		8,500					5,000	12,015,423	46	Eocene ls., ss.
Totumal	1951	8,000			4	2	(1)		26	Cretaceous ls., ss.
Valasquez	1946	6,800-7,100	14		14		4,500	5,154,153	26.1	Eocene sandston
Total Colombia			135	1,464	392	13	108,578	673,376,764		

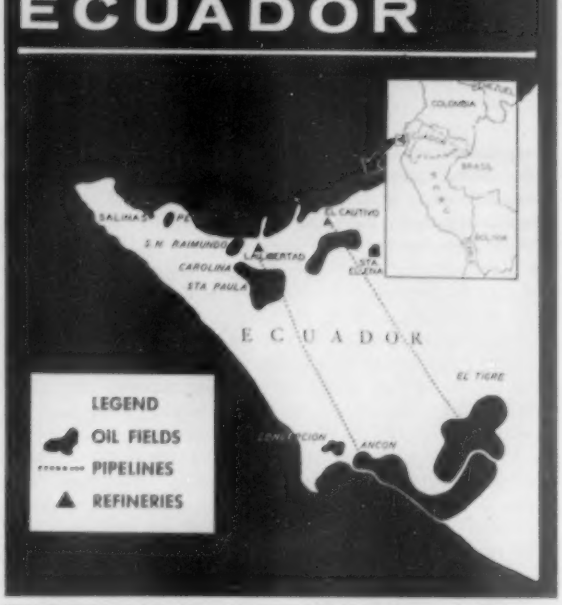
1. Test production only.

its future profits for exploration, and the Barco concession, operated by Colombian Petroleum Co., both appear to be at or past their peak output level. In De Mares, all wells are on artificial lift. Casabe is considered virtually drilled up, and lower production is anticipated from this area next year.

A number of modifications designed to encourage petroleum-industry operations, particularly exploration, have been placed in effect by the government during the last 3 years, and still other incentives are under consideration. Among these is an increase in the present 10 per cent depletion allowance, possibly to the 27½ per cent in effect in the United States. These steps indicate an awareness on the part of the government of the pressing need for further oil development. The rise in Colombian consumption over the last few years has outstripped the increase in production.

Broadened exploration in Colombia is held back largely by the record of many years of unsuccessful work in various parts of the country. The only postwar discovery of proved importance has been Velasquez. Texas Petroleum also found small production at Tetuan, and Intercol made discoveries in the Totumal area in 1951 and 1953. Results in these latter areas have so far been disappointing.

ECUADOR



Standard of California's exploration company continues geological work on around 3,000,000 acres held under concession in Ecuador . . . Two present producers — Anglo-Ecuadorean and Manabi — maintain drilling programs in order to hold country's present small output . . . Product imports now necessary because of fast-increasing domestic consumption . . . Ecuadorean railroad completes first section of pipeline carrying products from the coast . . . Line being extended on Quito . . .

Area, sq. miles	175,830	Value	$0.0585
Population	3,076,933	Refining cap., B/D	5,450
Capital	Quito	Production, B/D	8,500
Currency	Sucre	Number of fields	5
Reserves, bbl.		28,000,000	

A SMALL-SCALE integrated operation is carried out in Ecuador by the British-owned Anglo-Ecuadorian Oilfields, Ltd. This company produces about 7,100 bbl. daily out of the country's total of less than 9,000 bbl. daily, all

COLOMBIA REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Colombian Petroleum Co., Apartado 100, Cucuta—Tibu	2,000			
Empresa Colombiana de Petroleos, Barrancabermeja[1]—Barrancabermeja	36,500	15,130	16,500	A-1,400, L-450, [2]Alky-3,342
Texas Petroleum Co., Bogota—Guamo	1,000			
Total Colombia	39,500	15,130	16,500	

(1) Barrancabermeja refinery is operated by International Petroleum Co. (Colombia), Ltd., under a rental agreement with the owner, Empresa Colombiana de Petroleos, a Colombian Government corporation. (2) Alkylation unit (1,255 alkylate, 2,087 feed) autorefrigeration cascade reactor system.

ECUADOR PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Ancon	1921	4,000	27	1,068		12	6,413	47,481,862	38.7	Eocene
Santa Paula	1934	1,000		52		1	253	1,368,464	28.8	Eocene
Cautivo-Tigre	1920	4,000	3	130		2	1,116	6,954,550	37.0	Eocene
Concepcion	1931	4,000		24			162	1,244,452	38.0	Eocene
Petropolis and San Marcos	1937	2,500	1	25			181	1,125,866	29.8	Eocene
Total Ecuador			31	1,299		15	8,125	58,175,194		

ECUADOR REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Anglo-Ecuadorian Oil Fields, Ltd., Casilla 410, Guayaquil—La Libertad	5,000			
Manabi Exploration Co., Inc., Apartado 4075, Guayaquil—Santa Elena Peninsula	450			
Total Ecuador	5,450			

of which comes from fields on the Santa Elena Peninsula. Manabi Exploration Co., Houston, which bought out a British company 3 years ago, has most of the remaining production, except for minor output of three local companies, Carolina Oil Co., Petropolis Oil Co., and Concepcion Ecuadorian Oilfields, Ltd. During the last 20 years, several major exploratory efforts aimed at finding production in other parts of the country have failed. The Standard Oil Co. of California organization now has about 3,000 acres under concession in the coastal region of Ecuador and is doing preliminary geological work.

Anglo-Ecuadorian operates 16 rigs and has some 850 wells on pump to produce about 4,250 bbl. daily from the shallow zone of the old Ancon field. During the first half of the year, the company drilled six exploratory wells, five of them oil producers, for a total footage of 10,081 ft. Development drilling amounted to 106,330 ft. in 62 wells. For the last half, Anglo-Ecuadorian planned 61 development wells for a total 98,500 ft.

Manabi's first half drilling program consists of four exploratory holes, three of them oil producers, for 17,734 ft., and five development oil wells for 17,759 ft. Projected for the last half were two exploratory wells for 17,000 ft. and five development wells for 15,000 ft. Of the other three companies, Carolina drilled two development wells for 6,006 ft. during the first half and had four development wells projected the last half for 9,000 ft. Concepcion planned three development wells the last half of the year for 4,500 ft.

In addition to the Anglo-Ecuadorian refinery, Manabi operates a topping plant with 450-bbl.-daily capacity in the field area. Increases in domestic consumption have outstripped the country's production, and Ecuador now imports a part of its gasoline and heavy-fuel-oil requirements.

PERU

Area, sq. miles	514,059	Value	$0.0525
Population	8,558,000	Refining cap., B/D	47,500
Capital	Lima	Production, B/D	47,000
Currency	Sol	Producing fields	9
Reserves, bbl.		225,000,000	

THE high degree of exploratory interest current in Peru stems out of the enactment in 1952 of a new petroleum law which opened up the country on generally acceptable terms. With the exception of the small Ganso Azul operation on the headwaters of the Amazon River in eastern Peru, all of Peru's production comes from a group of fields along the northern coast operated by International Petroleum Co., Ltd. [Standard Oil Co. (N.J.)], the British-owned Cia. Petrolera Lobitos, and the government's Empresa Petrolera Fiscal. Some of these fields are approaching depletion, and the country's output of about 46,000 bbl. daily has been maintained only by intensive drilling. Increases in consumption in the country has made the development of new sources of production imperative.

The area of top interest when first Peruvian companies and later the foreign operators filed for concessions under the new law, was the Sechura Desert region lying south of the present coastal producing zone. It has easy access to the coast, and its geological prospects were considered favorably. Some 12 companies including several large foreign operators, took acreage in the Sechura and immediately launched exploratory work.

No Strikes in 11 Tests

The results since have again illustrated the uncertain nature of all oil-exploratory operations. Up to early fall, a total of 11 wells had been drilled in the Sechura, all of them failing to find oil production. Richmond Oil Co. (Standard Oil Co. of California) suspended its work after two unsuccessful tests. International drilled four wells, one of them on acreage of the Canadian company, Seaoil, Ltd., and Union Oil Co. of California put down five holes without success. Work was continuing in the region, although some geologists were now taking a pessimistic view. Union and International each were drilling new tests, the Peruvian company, Petrolea Peruana, was preparing for a well in the north not far from International's producing fields, and Texas Petroleum Co. (The Texas Co.) initiated seismograph work on Sechura acreage it acquired for Argentine and Peruvian interests.

Despite the disappointing results in the Sechura, a major exploratory play has been shaping up in the trans-Andean Montana—an entirely different geological province—where a number of companies were doing preliminary work on large blocks of acreage. The Peruvian law provides more favorable terms in an effort to encourage operations in this more remote section of the

PERU PRODUCTION

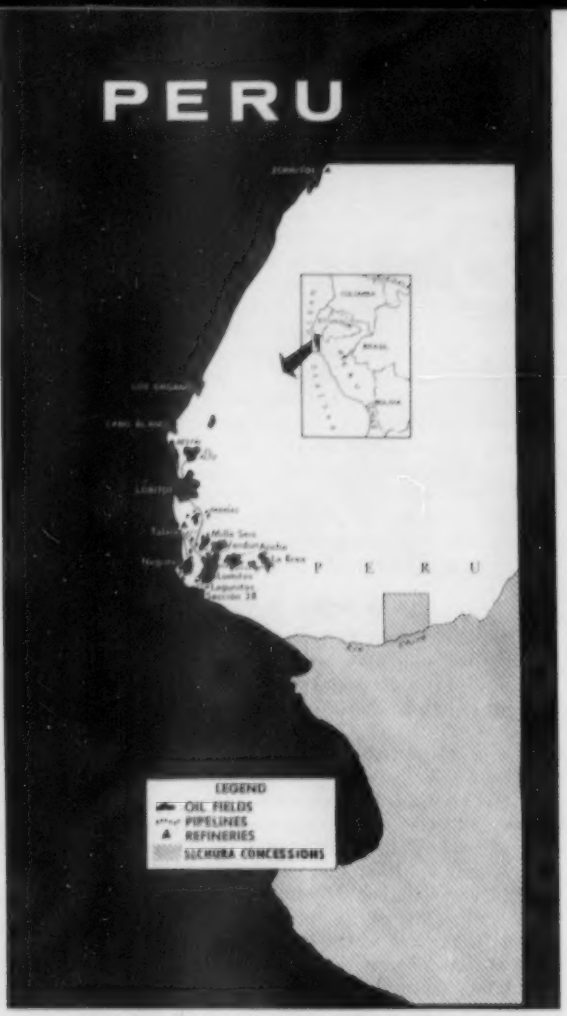
Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Agua Caliente	1938	1,200	4				[1]500	[1]1,371,212		
Cope	1938	650		6			20	156,225	34.6	Miocene ss.
El Alto	1910	2,000	4	666	131	5	6,516	89,987,519	38	Eocene sd.
La Brea Parenas	1888	3,000	200	1,700		6	29,000	361,800,000	36.6	Eocene sd.
Lobitos	1902	4,500	75	209	64	5	7,875		38.3	Eocene sd.
Los Organos	1946	1,500		87	12	4	1,522		34.7	Eocene sd.
Organos	1943	2,000	5	62	3	1	1,400	1,945,125	42.4	Eocene sd.
Punta Bravo	1940	2,400		2				5,000	36.2	Eocene sd.
Zorritos	1863	2,000		33				3,630,352	36.8	Mio., Olig. sd
Total Peru			288	2,765	210	21	46,833	458,895,433		

1. Estimated.

PERU REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Cia. de Petrole Ganso Azul, Ltda., Lima—Eastern Peru	1,000			
Empresa Petrolera Fiscal, Lima—Iquitos	2,500			[1]A-145, [1]V-1,000, [1]L-320, [1]W-120
International Petroleum Co., Ltd., Talara—Talara	44,000		15,200	L-600, C-2, A-1,420 V-2,800
Total Peru	47,500		15,200	

(1) Planned.



Exploration in Peru's Montana gathers momentum . . . Geological parties fan out throughout the jungle to study large tracts of acreage . . . Half a dozen large companies participating . . . Three prominent West German operators enter the play through agreement with Peruvian company on acreage . . . A dozen dry holes take the bloom off the Sechura . . . Interest here subsides, though sporadic exploratory work is expected to continue . . .

country where only large-scale production would justify the expensive development and costly pipeline necessary to move the oil to export markets.

The latter part of this year there were some 10 geological parties in the field in the Montana, and Texas Petroleum, which was the first large company to take out acreage east of the Andes, was commencing seismograph operations. Other companies holding Montana acreage were Richmond, Socony-Vacuum, Peruvian Pacific Petroleum Co. (Cities Service and Richfield), Ganso Azul, Ltd. (owned by United States group headed by Texas Gulf Producing Co.), Cia. Peruana el Oriente, Peruvian Oils & Minerals, and Petrolera Sullana, Ltd. During the summer Anglo-Saxon Petroleum Co. (Royal Dutch-Shell) took a permit to do geological and geophysical work in the Montana. Several of the concessionaires, Socony-Vacuum, Texas, Peruvian Pacific, Richmond, Peruvian Oils & Minerals, and El Oriente, arranged for a joint aerial survey of their extensive acreage holdings. Another development of interest was the agreement reached by a German group consisting of Deutsche Erdoel, Elwerath, and Wintershall with the Peruvian El Oriente company for operations on El Oriente concessions near the Ganso Azul area.

Other exploratory work in Peru has been taking place in the northern coastal region near the present producing fields. Douglas Oil Co. of California obtained production in drilling directionally from beach locations near the Lobitos producing property. To the east, Peruvian Pacific had shows in one of a series of tests on acreage obtained under agreement with the government's E.P.F.

The only large refinery in Peru is the newly expanded 45,000-bbl.-daily plant of International at Talara. Small topping plants are operated by Ganso Azul and by E.P.F. at Iquitos. The unit at Iquitos was moved from its former location at Zorritos on the coast. Petroleum requirements of the internal Peruvian market are supplied principally by International and Lobitos under a quota system.

The government in Peru early in the fall allowed increases in the abnormally low controlled price of products sold on the domestic market. The new price for motor fuel was fixed at the equivalent of about 10 cents a gallon —still one of the world's lowest. This price includes a consumption tax of about 3½ cents a gallon. International and Lobitos both warned the government and the public that imports of fuel oil have become necessary and that these will have to be made at full world market price. At present, about 70 per cent of the gasoline and virtually all the fuel oil produced in Peru and taken on the domestic market.

VENEZUELA

Area, sq. miles	352,150	Value	$0.3003
Population	4,985,716	Refining cap., B/D	528,360
Capital	Caracas	Production, B/D	1,874,000
Currency	Bolivar	Producing fields	89
Reserves, bbl.	10,930,000,000		

A SUBSTANTIAL expansion in operations in Venezuela over the next year can be anticipated if the government carries through with its plans to grant the first new oil concessions in the country in nearly 10 years. The prospect of the opening up of large new tracts for exploration and the possible entrance of a half dozen new companies in Venezuela promised enlarged geological and geophysical activity followed by stepped-up and more intensive drilling.

The government of President Perez Jiminez, which replaced the military junta in December 1952, called on the interested companies in October to submit offers for concessions on free acreage by the latter part of that month. Further action granting concessions on the basis of the bids was expected after the first of the year.

The last oil concessions in Venezuela were granted prior to 1945. In that year, a revolutionary junta dominated by the Accion Democratica seized power and subsequently inaugurated the policy of withholding further concession acreage. The subject has been a recurrent issue in Venezuela since the Accion Democratica was ousted in 1948. The policy has been decried by influential Venezuelans as they watched other countries, particularly Canada, attract a heavy flow of foreign oil capital. The possibility of eventual development of atomic energy was raised in reply to those who argued that some of the country's

EASTERN VENEZUELA PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
State of Anzoategui										
Apamate	1951	6,670	1		1		190	281,920	40.5	Mio., Olig., Eoc. ss.
Boca	1951	9,500	35		22		8,942	14,269,762	32.7	Oligocene ss.
Cachama Norte-1	1952	7,724	2		1		390	169,336	36.1	Mio., Olig. ss.
Caico Seco	1946	6,500-7,300	34		4		6,053	7,196,504		
Cascaroncito	1953		2			1	176	9,964	39	
Cerro Pelado	1951	4,400	1				112	52,836	43.4	Mio., Olig., Eoc. ss.
Chimire	1948	7,000-7,200	108		58	1	40,049	82,570,806	35.5-36.7	Mio., Olig. ss.
Dacion	1951	6,700					30,487	27,675,866	22	Oligocene ss.
El Roble	1939	8,040-11,560	24		13		3,455	24,902,429	58.5	Mio., Olig., Eoc. ss.
El Toco	1948	9,000	17		9		4,992	7,336,934	40.5	Mio., Olig., Eoc. ss.
Esquina	1951	4,360			2		175	409,656	41.5	Oligocene ss.
Fria	1948	6,500-7,300	16	3	2		3,521	3,550,471	34.5	Mio., Olig. ss.
Guara	1942	5,000-10,000	200	19	40	21	50,577	222,070,828	32.0-32.5	Mio., Olig., Eoc. ss.
Guario	1940	5,000-10,000	20		26		7,170	21,882,756	44.4	Mio., Olig., Eoc. ss.
Guere	1951	7,800	36		13	4	11,971	8,896,897	39.0	Mio., Olig., Eoc. ss.
Guico	1944	4,500-7,000	52		15		7,841	42,035,336	34.7-38.0	Mio., Olig. ss.
Inca	1948	7,100	3		4		210	502,658	34	Mio., Olig. ss.
Isla	1954	5,470					653	138,406	39.7	Miocene ss.
Junta	1954	6,720	6		4	2	2,399	167,268	23.6	Oligocene ss.
La Ceibita	1953	9,871-9,878	3		1	1	1,555	317,016	38.7	Eocene ss.
La Vieja	1951	2,570	9		8		1,019	1,184,677	24.5	Mio., Olig., Eoc. ss.
Las Adjuntas	1954	7,000-7,200	1		2		310	51,728	25.9	Miocene ss.
Leona	1938	8,000	23	14	12	3	5,833	21,390,684	28	Mio., Olig. ss.
Lobo	1952	6,400	7	2	3		1,938	510,536	26.7	Plio., Mio. ss.
Mapiri Este	1949	9,500	13		1	1	5,708	8,952,156	37	Miocene ss.
Mapuey	1953	6,742	2				653	125,080	39.2	Miocene ss.
Mata	1951	11,520	18		3	4	11,662	3,101,790	34.5	Oligocene ss.
Merey	1937	5,700	3	14	14	1	3,043	2,118,063	17.5-20.5	Mio., Olig. ss.
Nipa	1945	6,000-8,500	124		43	3	34,095	79,465,956	36.5-38.5	Miocene ss.
Oficina	1937	5,900	220	74	96	1	58,298	245,281,715	35	Oligocene ss.
Oscurote	1953	9,513	6		2	1	1,233	74,099	26	Mio., Olig. ss.
Pradera	1951	6,430	5			1	692	493,280	31	Mio., Olig. ss.
Quiamare	1942	5,900-6,650	15		4		3,726	3,282,644	41.7	Mio., Olig. ss.
Rincon Largo	1941	6,500-8,500	6		1		1,092	6,325,544	16.0	Mio., Olig. Eoc. ss.
San Joaquin	1939	6,560	43		28	3	10,317	11,364,696	42-45	Mio., Olig. Eoc. ss.
San Roque	1949	8,500	20		12		4,486	10,931,716	48.8	Mio., Olig., Eoc. ss.
Santa Anna	1936	8,500	37		6	3	13,989	20,161,440	37.1	Mio., Olig., Eoc. ss.
Santa Fe	1953	11,113-11,573	1				170	96,236	30.7	Eocene ss.
Santa Rosa	1941	8,500	30		9	5	12,788	16,313,072	44	Mio., Olig. ss.
Soto	1949	9,500	114		27	7	38,566	31,880,693	35	Oligocene ss.
Tacata	1946	2,210	1				174	175,688	38.8	Miocene ss.
Tagua	1950	7,800	1				25	49,600	38.0	Oligocene ss.
Tapuco	1952	10,000-10,170	18		1	1	7,414	3,887,012	24.6	Mio., Olig. ss.
Yopales	1937	4,600	13	13	9		4,667	8,573,035	31.9	Mio., Olig. ss.
Zeta	1954	10,700	8		1	4	8,999	717,196	29.9	Miocene ss.
Total Anzoategui			1,295	139	497	68	411,910	929,581,289		
Federal Territory of Delta Amacuro										
Pedernales	1933	1,571	14		18	1	11,525	30,579,192	21.5	Miocene ss.
Tucupita	1945	5,600	30		9		7,814	20,526,339	16.5	Miocene ss.
Total Delta Amacuro			44		27	1	19,339	51,105,531		
State of Guarico										
Belen	1954							424	32.2	
Bella Vista	1952		35		2		3,104	973,820	35	Mio., Olig. ss.
Dakoa	1953		2			1		20,196	32.2	
Grico	1946	400-4,870	1				174	47,769	28.9	Cretaceous ss.
Las Mercedes	1942	4,160-4,500	137	13	54	8	24,406	47,389,632	29.5	Mio., Olig., Eoc. ss.
Piragua	1954		2		1	1	13	1,024	39.6	
Punzon	1946	4,400			1		162	238,368	39.6	Mio., Olig., Eoc. ss.
Ruiz	1949	4,450	52		20		6,678	13,132,108	31.5	Mio., Olig., Eoc. ss.
Saban	1947	2,600	38	8	15		8,975	5,765,911	36.9	Mio., Olig., Eoc. ss.
Taman	1949	5,200	4	10	6		1,170	8,897,625	38.4	Mio., Olig., Eoc. ss.
Tucupido	1947	2,800-5,600	17	2	15		1,686	11,954,208	39	Eocene ss.
Total Guarico			288	33	114	9	46,368	88,421,085		
State of Monagas										
Jusepin	1938	3,000-5,300	210	17	125	2	16,734	151,541,180	32.5	Mio., Olig. ss.
Mata Grande	1946	4,700	13		11		1,292	3,738,274	28.5	Mio., Olig. ss.
Mulata	1941	3,500-6,600	133	10	49	1	8,516	74,714,212	36.2	Mio., Olig. ss.
Muri	1942	4,500	31	4	20		806	14,080,209	27.5	Miocene ss.
Orocual	1933	2,000-5,000			13			68,120	28.3	Mio., Olig. ss.
Quiriquire	1928	6,500-8,000	6	472	50	1	71,342	444,415,712	16.6	Pliocene ss.
Santa Barbara	1941	5,000-6,500	159	3	56	3	8,614	81,677,582	31	Mio., Olig. ss.
Tacat			9		1	6	426	19,340	38.8	Miocene ss.
Temblador	1936	3,500-4,500	73		28		7,933	46,020,409	21.7	Mio., Olig. ss.
Travieso-2	1944	4,000		9			161	1,216,700	27.3	Miocene ss.
Total Monagas			634	515	353	13	115,824	817,491,738		

WESTERN VENEZUELA PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
State of Barinas										
Barinas							107	5,000		
San Silvestre	1945	8,888			4		123	25,000		
Total Barinas					4		230	30,000		
State of Trujillo										
Motatan	1938	8,850	5				410	140,252	26.3	Eocene ss.
State of Falcon										
Cumarebo	1913	1,968	36	12	18	3	5,909	48,724,566	47.8	Miocene ss.
El Mamon	1926	3,350	3		2		582	399,171	36.3	Miocene ss.
Mene de Mauroa	1921	1,000		35	155	1	784	26,730,207	36.9	Oligocene ss.
Hombre Pintado	1927	600-1,850		27	24		456	5,462,477	25.4	Oligocene ss.
Tiguaje	1953	3,348	2		1	1	166	54,606		
Total Falcon			40	74	200	5	7,897	81,371,027		
State of Zulia										
Bachaquero	1930	3,444	284	776	499	10	189,014	409,726,836	12.7-16.5	Mio., Olig., Eoc. ss.
Boscan	1946	6,500-7,500		91	16	4	37,076	32,532,226	9.4-10.3	Eoc., Cret. ss.
Cabimas	1917	2,200	146	721	262	1	76,662	736,971,272	19-25.1	Mio., Olig., Eoc. ss.
El Cubo	1916	984	36	98	55	1	18,806	137,103,880	35.6	Eocene ls., ss.
Ensenada	1948	8,550					254	411,676	57.1	Eoc., Cret. ss.
La Concepcion	1935	3,148-8,000	6	64	14	4	10,256	44,787,467	36.2	Eoc., Cret. ss., ls.
Lagunillas	1926	3,000	328	1,474	367	8	479,646	2,390,114,553	14.9-16.0	Mio., Olig., Eoc. ss.
La Paz	1925	4,264-8,000	59	18	28	3	112,910	388,390,248	33.4	Eoc., Cret. ss., ls.
Mara	1945	5,248	33		41	6	61,749	173,942,303	29.2-30.2	Cretaceous ls.
Mene Grande	1914	4,132	20	387	200	2	45,354	417,121,538	17.8	Ter., Jur., Eoc. ls.
Pueblo Viejo	1940	1,968	4	14	7	1	2,954	14,883,432	14.0-19.9	Mio., Olig., Eoc. ss.
Sibucara	1948	13,451	4		1	2	11,258	17,874,518	37.4	Cretaceous ls.
Tia Juana	1928	3,000	4	46	109	1	196,348	892,491,965	12.5-26.7	Mio., Olig., Eoc. ss.
Total Zulia			924	3,689	1,599	43	1,242,287	5,656,351,914		
Total Venezuela			3,230	4,450	2,794	139	1,844,265	7,624,462,836		

VENEZUELA REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	—Special processing—
Compania Shell de Venezuela, Apartado 809, Caracas:				
Cardon	145,000		33,500	
San Lorenzo	45,000			
Creole Petroleum Corp., P.O. Box 889, Caracas:				
Caripito	70,000		42,000	
Amuay	159,000			[1] [2]11,000
Mene Grande Oil Co., Caracas—Oficina field	1,000			
Phillips Oil Co., P.O. Box 1031, Caracas—San Roque	2,500			
Sinclair Oil & Refining Co., P.O. Box 1706, Caracas—Puerto La Cruz	35,000			
Socony-Vacuum Oil Co. of Venezuela, P.O. Box 246, Caracas:				
Campo San Silvestre	120			
Campo Guario	140			
Texas Petroleum Co., P.O. Box 267, Caracas—Tucupita	10,000			
The Colon Development Co., Ltd., Apartado 809, Caracas:				
Casigua	1,000			
El Calvario	300			
La Rivera	300			
Venezuelan Gulf Refining Co., P.O. Box 709, Caracas—Puerto La Cruz	59,000		10,000	
Total Venezuela	528,360		85,500	

(1) To be completed in 1955. (2) Asphalts available as market demands.

prospective oil land should be reserved for the benefit of future generations.

Under the 1943 Venezuelan petroleum law—which is still in force—virtually all the companies converted their acreage holdings to new 40-year concessions carrying a basic one-sixth royalty. With no new areas granted, the acreage held by the companies has shrunk year after year as they turned back the required 50 per cent in converting from the exploration stage. At present most of the concession acreage in Venezuela is in the exploitation phase. As of the beginning of the year, a total of 15,334,329 acres, representing 17.9 per cent of Venezuela's general sedimentary basin area, was held by 23 companies, the four leaders in this respect being Creole Petroleum Corp., holding 20.84 per cent of the total acreage under concession; Royal Dutch-Shell, 20.13 per cent; Mene Grande Oil Co., 15.96 per cent; and Socony-Vacuum Oil Co. of Venezuela, 12.13 per cent.

Since the future of an oil-producing enterprise depends on continued renewals to reserves, the leading operators in Venezuela have publicly declared themselves in favor of opening up the country to new concessions. In addition, there are several newcomers anxious to enter Venezuela. These include Cities Service Co.; Conorada Petroleum Corp. (Continental Oil Co., Ohio Oil Co., and Amerada Petroleum Corp.); Superior Oil Co.; Tide Water Associated

VENEZUELA

Still, and by a large margin, the world's top oil exporting country . . . Government moves toward opening up additional acreage . . . Bids for new concessions taken from private companies with offers running into many millions of dollars . . . Government expected to act sometime after the first of the year . . . Look for a sharp and immediate upturn in drilling if and when new acreage grants become firm . . . Venezuela's uncommitted areas rank as best exploration territory in Western Hemisphere . . . Present operating companies working existing concessions score important gains in production and reserves . . . Country's reserves now nearing eleven billion barrels . . . Production up with improvement in fuel oil markets, and another increase anticipated in 1955 . . Operators make further progress in gas conservation by building injection and gasoline plants . . . Government studies fertilizer and other petrochemical activities . . . Shell starts large pipeline to move crude from new field in Lake Maracaibo . . . Creole at work on major improvement and expansion of Amuay refinery, doubling capacity.

Oil Co.; Cie. Francaise des Petroles; and another French group backed by Seuz Canal Co.

Another spur to the granting of new concession areas in Venezuela is the need to find additional sources of light-crude production. At present more than half the country's output consist of heavy oil of 25° gravity or below, from the large fields of the Lake Maracaibo basin. A large part of this heavy-oil production moves into the United States as residual fuel oil, and the prosperity of the Venezuelan petroleum industry, which dominates the Venezuelan economy, is thus linked closely to the rise and fall of the market for this product. The United States takes 36 per cent of Venezuela's total production, and another 9 per cent goes into Canada. The possibility of restrictions in the United States against foreign oil imports, especially against residual fuel oil as is being agitated by the coal industry, is a serious threat to Venezuela.

Though restricted since the end of World War II to existing acreage holdings, the 12 producing companies in Venezuela have maintained the country's positon as the world's largest oil-exporting nation and second-largest producer. Refining capacity, much of it built in the postwar period, amounts to about 470,000 bbl. daily. The crude production the latter part of this year of about 1,850,000 bbl. daily represents a 40 per cent increase over the level of output of 5 years ago. Venezuela's crude reserves are well over 10 billion barrels.

Although the tremendous development of its oil industry has brought problems to Venezuela, the country stands out as an example of the benefits of private enterprise and a government with a long record of cooperation with private enterprises. With the approximately $400,000,000 it receives from the producing companies, Venezuela has been accomplishing a large-scale public-works program embracing schools, housing, communications, public health, and sanitation. Venezuela is one of the largest of the United States export markets, absorbing more than $400,000,000 in U. S. goods annually. The government takes the equivalent of about 63 cents a barrel in the form of direct taxes on oil production, and these receipts make up some 56 per cent of the republic's total government revenue. Better than 90 per cent of the country's foreign exchange comes from purchases by the operating oil companies. Venezuela has a rising petroleum consumption, now about 60,000 bbl. daily, more than twice what it was in 1948.

Among the problems faced by Venezuela is inflation and the danger of too great a reliance on the petroleum industry. Though inflation now seems to have been checked, the high level costs has discouraged establishment of some local industry, despite government assistance

and a desire to avoid further increases in imported commodities. Under its policy "Sembrar el Petroleo," or "sow the petroleum," Venezuela has sought to plow its oil revenue back into the country's economy. The government is planning the establishment of a national steel industry, using its great iron-ore reserves which are only now beginning to be produced. Also under study are petrochemical operations, probably centering initially on fertilizer production. The government has had some success in improving agriculture which, though it employs about half the working population, still produces only about two-thirds of the food needed for the rapidly increasing population.

For the last several years, the number of operating drilling rigs in Venezuela has varied around the 100-110 mark without showing significant change in total. The larger companies, particularly Creole, have sought to hold their level of operations at a fairly steady rate. This has been the policy since 1949 when a slump in the petroleum industry both in the United States and abroad caused cutbacks and personnel dismissals in Venezuela, a step which threatened serious repercussions. Although most of the rigs in Venezuela are operated by the companies themselves, Loffland is active as a contractor, running some six strings. The drilling picture in Venezuela during the last 3 years has shown a shift in emphasis to the eastern part of the country where lighter oil is generally found. There has been a corresponding drop in Western Venezuela which produces largely heavy oil.

One of the principal areas of exploratory interest in Venezuela is Barinas. Socony-Vacuum made the initial discovery in this large, undeveloped basin 6 years ago, and since then Sinclair has brought in several producers on a Barinas concession. There is a large amount of open acreage in this region, and considerable geological and geophysical work has been under way. The wells so far drilled are still shut in, and Socony-Vacuum is believed to be waiting for an opportunity to acquire additional acreage before making plans for the construction of a pipeline outlet to the Caribbean, probably at Puerto Cabello.

The fortieth anniversary of the discovery of the first commercial production of importance in Venezuela was celebrated this summer. A commemorative plaque was unveiled by the Shell organization at the site of Mene Grande 1 which was brought in at the beginning of August 1914. This discovery led to Mene Grande field, now producing 46,000 bbl. daily, and also to the development of the great Maracaibo producing basin which now yields around 1,250,000 bbl. daily, or about two-thirds of the country's total.

Prewar the Venezuela refining industry had a capacity of 54,000 bbl. daily, and most of the country's production was shipped to the Shell and Jersey Standard refineries in the nearby Netherlands West Indies islands of Aruba and Curacao for processing and reexport. The great expansion in the Venezuelan refining industry since the end of World War II is in line with obligations imposed when concessions were renegotiated under the 1943 hydrocarbons law. Except in certain cases where an alternative refining obligation was negotiated, the government required that one-tenth of the production from new concessions be refined within Venezuela, although the rule was not applied to converted concessions. It also required that none of the remaining nine-tenths of such production could be refined in the Caribbean area outside Venezuela.

After the war, Shell and Creole both built large refineries on the Paraguana Peninsula to refine Western Venezuela crude, and subsequently connected these plants with the Maracaibo fields by long-distance pipelines. Shell's Cardon refinery ranks as Venezuela's largest, having a capacity of about 170,000 bbl. daily, including crude charged to the cracking units. The company has added lubricating-oil manufacturing facilities at Cardon and has announced plans for the construction of a 35,000-bbl.-daily fluid catalytic cracking unit. At present, all cracking capacity of Venezuelan refineries is in thermal units.

The Creole refinery at Amuay Bay is now being expanded by the construction of an additional 75,000 bbl. daily in crude capacity and a large fluid Hydroformer. Other new refineries built in Venezuela during the last 5 years include the Sinclair plant at Puerto La Cruz, with a 30,000-bbl.-daily capacity, the Venezuela Gulf Refining Co. plant also at Puerto La Cruz, capacity 59,000 bbl. daily, and the 1,800-bbl. daily Phillips refinery at Santa Ana in Eastern Venezuela. The Phillips plant is primarily for wax production. It was completed in 1952 with a capacity to produce high-grade finished paraffin at an annual rate of 6,000,000 lb. and is now undergoing expansion to increase yearly production to 9,000,000 lb.

On the pipeline side of the Venezuela industry, of particular interest were the plans of Cia. Shell de Venezuela (the principal operating company for the Royal Dutch-Shell organization) for the construction of a 45-mile crude line from its Block 1 offshore field in Lake Maracaibo to the Palmarejo terminal. This line will have a capacity to move 100,000 bbl. daily and will include an 18-mile underwater section of 16-in. pipe.

URUGUAY

FOLLOWING out a long-range plan which was initiated in 1948, Administracion Nacional de Combustibles, Alcohol y Portland (ANCAP), an autonomous institution of the Uruguayan Government, latter part of this year was expected to commence exploratory drilling in the country. A mixed geophysical party using gravity meter and magnetometer equipment has done considerable work in areas considered to be possible of oil production. Several tests were planned for 1955. All ANCAP's work of this nature is being handled by contract firms.

ANCAP holds monopoly rights from the government for crude-oil and alcohol refining in Uruguay. It has operated at refinery at La Teja on Montevideo Bay since January 1937. The plant now has a capacity of around 28,000 bbl. daily, a capacity which includes two topping units and a cracking plant that operates alternatively as an atmospheric unit. ANCAP's plans call for further increases in the capacity of the refinery through construction of a new topping unit, vacuum unit, and catalytic cracker. The agency also owns three tankers, an alcohol distillery at Capurro, and two bulk plants.

TRINIDAD

Area, sq. miles	1,864	Value	$0.89
Population	611,000	Refining cap., B/D	115,000
Capital	Port-of-Spain	Production, B/D	64,500
Currency	Dollar	Producing fields	8
Reserves, bbl.		280,000,000	

FURTHER small gains have been made in the producing rate in Trinidad, and output, which at the middle of the summer was running at 64,500 bbl. daily, slightly exceeds the previous wartime peak. Production is main-

TRINIDAD

Trinidad operators take to the sea in an effort to bolster island's crude reserves . . . three-company group drills from a large platform in the Gulf of Paria . . . Well is first attempt to find production in water between Trinidad and Venezuela . . . Small increases in present Trinidad production push total output to new all-time high . . . Most additional oil coming from extensions and new pools . . . Standard of California subsidiary continues preliminary work in major Trinidad exploratory effort . . .

tained by continued development drilling, with some additional oil coming largely from extensions of existing fields. Ten companies, predominantly British owned, control Trinidad's production. Among them are Trinidad Leaseholds, Ltd.; United British Oilfields of Trinidad, Ltd.; Trinidad Petroleum Development Co., Ltd.; Antilles Petroleum Co. (Trinidad) Ltd.; Apex (Trinidad) Oilfields, Ltd.; Kern Trinidad Leaseholds, Ltd.; and Trinidad Central Oilfields, Ltd.

Trinidad is the site of two large refineries. The principal processing facility is the 85,000-bbl.-daily plant of Trinidad Leaseholds, Ltd., which has been modernized and expanded during the last few years.

On the exploration side of the Trinidad industry, the most significant development was the commencement of Trinidad's first offshore drilling operation. Trinidad Northern Areas, Ltd., in which ownership is shared by Trinidad Leaseholds, U.B.O.T. (Royal Dutch-Shell) and D'Arcy Exploration Co., Ltd. (Anglo-Iranian), erected a platform and began drilling during the summer at a location in the Gulf of Paria 6 miles from Cedros Point off the southwestern corner of the island.

T.N.A. spent the equivalent of about $1,800,000 on the offshore operation prior to the start of drilling. Included in this sum was the cost of geophysical surveys which the company has been carrying out in its marine concessions for several years. T.N.A. has unsuccessfully explored in Trinidad since 1936 in a program that has cost some $5,000,000 to date. Geological and geophysical studies have covered a large part of the island, and a number of onshore locations drilled without finding production. In the offshore drilling project, Shell through U.B.O.T. is provided technical advice and assistance. In view of the intensive exploration of most of the land areas of Trinidad, hope for developing additional large sources of oil appears to rest primarily on this and whatever other marine drilling is undertaken.

Another event occurring during the summer in Trinidad was the opening of a new 32-mile pipeline carrying crude oil from two fields in southern Trinidad west to U.B.O.T.'s refinery at Point Fortin. The 6 and 8-in. line extends across the southern part of the island from Balata-E field. Crude also is moved into the line from Catshill field. When the line was dedicated, speakers pointed out that the two fields represented the only success in an exploration program which has cost $3,500,000.

TRINIDAD PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Brighton-Vessigny	1908	700-4,600					3,080		16-38	Oligocene sd.
Forest Reserve-Apex-San Francique	1913	100-8,000					24,940		15-33	Miocene sd.
Guayaguayare	1902	500-6,000					1,640		15-49	Miocene sd.
Kern-Parrylands-Cruse	1913	2,000-4,000					9,700		13-30	Miocene sd.
Palo Seco-Los Bajos	1926	460-6,400					4,160		16-33	Miocene sd.
Penal-Barrackpore	1918	500-10,000					9,760		11-35	Oligocene sd.
Point Fortin-Point Ligoure	1908	1,000-7,825					4,260		15-45	Miocene sd.
Quarry-Coora-Quinam-Morne Diablo	1936	280-6,480					6,960		16-30	Oligocene sd.
Total Trinidad			853	1,832		20	64,500	489,570,704		

TRINIDAD REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Brighton Terminal, Ltd., 30 Rockefeller Plaza, New York 20, N. Y., U.S.A.—La Brea	5,000			
Trinidad Leaseholds, Ltd., Trinidad House, 29-30 Old Burlington St., London W. 1, England—Pointe-a-Pierre	80,000	15,000	35,000	V-30,000, Alky-1,100, P-150
United British Oilfields of Trinidad, Ltd., 15 Ambercrombay St., Port of Spain—Point Fortin	30,000			
Total Trinidad	115,000	15,000	35,000	

URUGUAY REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Ancap La Teja, Casilla de Correo 1000, Montevideo—La Teja	28,000		2,000	

MEXICO

The year's biggest oil news in Mexico was the discovery of light crude at Tecolutla . . . Discovery continues extension of the old Golden Lane trend . . . Further broadening of Pemex's exploratory program promised for 1955 . . . Mexico's production on the upgrade as a result of increasing internal demand and improved export outlets for heavy fuel oil and low-gravity crude . . . Exploratory work, refinery construction, and pipeline extensions are being stimulated . . . Pemex takes first steps toward large-scale improvement of refineries . . . Catalytic cracking contracted for old Minatitlan refinery in southern Mexico . . . West Coast plant planned, and modernization studied for older refineries on the Gulf Coast . . . New lubricating-oil plant, Mexico's first, opened at Salamanca . . . Output will sharply cut country's reliance on lube imports . . . More gas pipelines under way in northern Mexico, and Pemex looks to eventual large sales of gas from border fields to United States transmission companies . . . Pemex's financial position bettered by authorized increases in motor-fuel prices on the Mexican market.

MEXICO

Area, sq. miles	760,383	Value	$0.0805
Population	26,332,000	Refining cap., B/D	243,500
Capital	Mexico City	Production, B/D	232,000
Currency	Peso	Producing fields	23
Reserves, bbl.	1,750,000,000		

IN August of this year, the Mexican Government oil agency, Petroleos Mexicanos, brought in what it considers to be its most important oil discovery of recent years. The well was Miguel Hidalgo 1, drilled about 1½ miles west of the Tecolutla River in the State of Veracruz. The significance of the discovery lay in the fact that it appears to be another major extension of the Golden Lane trend and that it promises the first substantial reserve of the first light oil found in Mexico in several years.

The discovery was drilled to about 7,700 ft. and on test flowed at a rate of 3,000 bbl. daily from the El Abra limestone of the Middle Cretaceous. The crude was of 31° gravity. Pemex began work immediately on a 14-in. pipeline to move the oil 15 miles to Ezequiel Ordonez field and into the system to Poza Rica. Three additional rigs were moved into the area and a rapid development program established. Pemex also began drilling a promising adjacent structure on the Tecolutla beach.

Mexican Oil Program Expands

In August of this year, Mexican crude-oil production averaged 233,757 bbl. daily, and it appeared the output for the year will amount to around 235,000 bbl. daily. This compares to an average of slightly under 200,000 bbl. daily last year, a period when Mexican production, like that in Venezuela, was severely depressed because of the slump in the market for heavy oil. Early this year, Mexico's export sales rose due to new contracts with foreign purchasers, including one with McBride Oil & Gas Corp., San Antonio, for the delivery of 2,400,000 bbl. over a 5-year period.

During the year ended June 30, Petroleos Mexicanos completed a total of 321 wells, including 201 development and 120 exploratory holes. Drilling during the latter part of 1954 was at about the same annual rate. In July and August, 51 wells were completed, including 18 exploration and 33 development. In the year ended June 30, Pemex drilled 49 rank wildcats out of the 120 exploratory wells. On these, it had a success ratio of 30.6, represented by the 15 commercial field discoveries. Of all the 120 exploratory holes, 65 were productive, and of the 201 development wells, 163 were productive.

The magnitude of the exploratory work being carried on by Pemex is reflected in the figures on exploration parties. During the year ended June 30, Pemex used 28 geological, 16 seismograph, 4 gravimetric, and 1 electrical-resistivity crew, accumulating a total of 246 crew-months of geological work and 228 crew-months of geophysical exploration.

Refining and Transportation in Forefront

In the years since the 1938 expropriation, Pemex has devoted much of its energies and resources to the country's refining and pipeline-transportation system. The Mexican petroleum industry prior to 1938, then in the hands of private foreign companies, was geared largely to the export market and only a relatively small internal consumption. Particularly since the war, the main emphasis has been on the development of a distribution and processing system to serve Mexico itself. With industrialization and a rising population and living standard, Mexico's petroleum requirements this year are estimated at 190,000 bbl. daily on a crude equivalent basis, up 8½ per cent from 1953.

Recently, Pemex has been placing more and more stress on the exploratory side of its operations. New drilling equipment has been brought into the country, and a more widespread search for new fields undertaken. Surface geological work has been renewed in Lower California, and crew activity stepped up in the northern and western parts of the Yucatan Peninsula. A wildcat was commenced early this year in the Purisima area in the southern part of Lower California.

The principal and most urgent need of Pemex is additional capital resources. This year, the agency will pay the Mexican Government the equivalent of slightly more than $40,000,000 in taxes and other payments. The capital requirements of Pemex are rising steadily, not only for expenditures in Mexican currency but also for the substantial amount of equipment and services it must buy outside the country, principally in the United States. Pemex's financial position was made somewhat more difficult this year following the devaluation of the Mexican peso by the government.

The value of the peso was cut from 11½ to 8 cents U.S. in April, but it was not until September that the government allowed Pemex to raise the price of motor fuel on the domestic market. During this period, although Pemex's peso income was unchanged, the value of these pesos for its purchases in the United States, not only for equipment but also for the oil supplies it imports into parts of the northern border area and the West Coast, was seriously reduced.

First Lube-Oil Plant on Stream

Pemex is carrying out an expanded refinery and pipeline-construction program concurrently with its broadened exploratory effort. This fall, the country's first lubricating-oil plant was brought into operation at the Salamanca refinery. An associated vacuum-distillation unit raised capacity of the refinery itself from 30,000 to 40,000 bbl. daily. Pemex 2 years ago borrowed a large sum from the Mexican Savings Bond Administration to finance this project.

Other refinery work of Pemex includes a modernization and expansion program for the Minatitlan refinery in southern Mexico. The project will include the construction of a T.C.C. catalytic cracking unit, the first in Mexico. The work will result in increasing the capacity of the refinery to about 40,000 bbl. daily. This summer, Pemex announced plans for the eventual construction of a new 30,000-bbl.-daily refinery at Guaymas on the West Coast in the State of Sonora.

Further activity has been taking place in Mexico in the field of pipeline construction. Late last year, a products system extending to various population centers served from the Salamanca refinery was completed. Work is continuing on a natural-gas line from Monterrey to Torreon which later will be continued into Chihuahua City.

MEXICO REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Petroleos Mexicanos, Av. Juarez 94, Mexico, D.F.:				
Arbol Grande	23,000			L-100, A-750
Atzcapotzalco[1]	52,000		14,500	
Ciudad Madero	78,000		6,500	A-2,700
Mata Redonda	17,000		6,000	
Minatitlan[2]	32,000			L-500, V-6,500
Poza Rica	4,500			
Reynosa	7,000			
Salamanca[3]	30,000		5,000	
Total Mexico	243,500		32,000	

(1) 50,000-bbl. distillation unit, 32,000-bbl. vacuum distillation unit, 22,000-bbl. cat cracker, a 12,000-bbl. desulfurization unit, catalytic polymerization unit, and a 1,300-bbl. alkylation unit are now being constructed. (2) 25,000-bbl. distillation unit, 25,000-bbl. desalting plant, cat cracker of 15,000-bbl. capacity, and a catalytic polymerization unit now under construction. (3) 14,000-bbl. vacuum distillation unit, 2,800-bbl. propane deasphalting unit, 3,040-bbl. furfural solvent-extraction plant, and a methyl ethyl ketone (MEK) dewaxing unit now being built.

Central America and the Caribbean Area...

CUBA

Area, sq. miles	44,206	Value	$1.00
Population	5,469,000	Refining cap., B/D	9,700
Capital	Havana	Production, B/D	100
Currency	Peso	Producing fields	4
Reserves, bbl.	3,000,000		

A SMALL but interesting oil discovery last May in the central part of Cuba has touched off the most excited oil boom in the island's history. The well was the Echevarria test drilled by Kerr-McGee Oil Industries, Inc., for a local Cuban group at a location southeast of Jarahueca field in Camaguey Province. Echevarria was taken to 8,375 ft. using a rig leased from the Cuban Government. Several zones were tested, and one of these, from 1,072-88 ft., produced about 5 bbl. an hour of 14.5°-gravity crude containing varying amounts of water.

The significance of the well lay in the fact that the production was the first obtained in Cuba from sedimentary work. All previous Cuban production, amounting to less than a few hundred barrels daily, has come from serpentine rocks of igneous origin, and a search for more substantial production from sedimentary formations has been under way at various times in Cuba for the last half century. The Echevarria production was obtained from sands identified as Upper Cretaceous.

The possibility of finding oil in advantageously situated Cuba brought a rush for concession acreage. The companies participating in this play consisted mainly of independent operators from the United States, along with some newly formed firms with no previous background of oil exploration. The Echevarria well also stimulated interest on the part of several major companies previously holding acreage in Cuba. Among these was Cuban Gulf Oil Co. which several years ago drilled two unsuccessful deep wells off the north coast of Cuba. Gulf was reported to have undertaken a core-drilling program near the town of Placetas, and Shell and Atlantic Refining Co. resumed geophysical work.

Deep Rock Oil Corp. and Sterling Oil of Oklahoma, both Tulsa firms, announced plans to conduct joint exploration and development programs on approximately 5,200,000 acres of Cuban concessions. The group was to start drilling the latter part of this year. Operations were on land acquired from Caribbean Petroleum Associates, Inc. Another new operator in Cuba was Cuban American Oil Co., partly backed by the Grady Vaughn-Herbert W. Klein interests of Dallas. Cuban American made an agreement for operations on 750,000 acres controlled by Trans-Cuba Oil Co. and Cuban-Venezuelan Oil Voting Trust.

Among other independents moving into Cuba was Ted Jones, Los Angeles operator, who organized a company to explore a large section extending eastwar along the coast from Havana Harbor. Russell Cobb, Jr., Tulsa independent, disclosed he was negotiating for 750,000 acres of concessions in Cuba. A Canadian firm, American Le Duc Petroleum Co., organized Cuban-Canadian Petroleum Co., Ltd., for operations in Cuba. Another newly formed Cuban oil company was Cuban American Petroleum Corp. whose board chairman was Joseph W. Frazer, chairman of Graham-Paige Corp., and whose directors included John Roosevelt, son of the late president. This company had plans for drilling later in the year.

Late this fall, equipment and personnel was being shipped into Cuba by a number of companies, and a substantial drilling effort appeared to be shaping up. Cuban American Oil, the company in which Vaughn and Klein

CUBA

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Bacurnao		400					100	160,000	22-30	
Echevarria	1954	8,360	2			3	(1)		15-17	Sed. Tuff.
Jarahueca	1943	1,250					70	1,300,000	37-39	Lower Cretaceous
Motembo	1880	1,250					(2)	2,200,000	62	Lower Cretaceous
Total Cuba			2			3	170	5,100,000		

(1) Field shut in at midyear. (2) Distillate field.

CUBA

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Esso Standard Oil Co., S.A., P.O. Box 1303, Havana—Belot	6,500		2,400	
Petrolea Jarahueca, S. A., Jarahueca—Jarahueca	200			
Refinadora Cabaiguan, S.A.—Cabaiguan—Cabaiguan	1,000			
Total Cuba	7,700		2,400	

PUERTO RICO

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Caribbean Refining Co.—San Juan	(1)			

(1) Company building 10,000-bbl. per day refinery.

NETHERLANDS WEST INDIES

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Lago Oil & Transport Co., Aruba, Netherlands West Indies—Aruba	440,000	44,000	275,000	Alky-5,000, V-16,000
N.V. Curacaosche Petroleum Industrie Maatschappij, The Hague—Curacao	200,000		118,000	
Total Netherlands West Indies	640,000	44,000	393,000	

were interested, was nearing the 4,000-ft. projected total depth in its first well in Cuba's central basin.

The exploratory play in Cuba was encouraged by Cuba's own highly favorable oil laws. In July, the government issued a new decree law further increasing the inducements for oil exploration. The government announced a new policy under which it would make loans for operators ready to invest $1,000,000 or more. The government planned to lend up to two-thirds of that amount at 6 per cent interest with no repayment if oil is not found. Additional royalty and a bonus were payable in case of commercial production. The government also reduced surface taxes on exploration concessions to the equivalent of about 2 cents an acre and exempted operators from the 10 per cent profits tax, along with certain other tax levies, provided they start drilling immediately and continue without interruption.

Prior to the Echevarria discovery, production in Cuba amounted to less than 100 bbl. daily. Most of the oil comes from Jarahueca field which is nearing depletion. The Jarahueca crude is about 38° gravity. The other two fields in Cuba with a history of production are Motembo which still makes about 1,000 bbl. per month of 60°-gravity distillate, and Bacuranao, now almost completely depleted. All these fields tap shallow igneous clastic reservoirs, ranging in depth from 300 to 2,200 ft.

The principal refinery in Cuba is the 6,500-bbl.-daily Havana plant of Esso Standard Oil Co. Two smaller plants are operated by local Cuban interests. During the past year, it was disclosed that Cia. Petrolera Shell de Cuba, S.A., the Royal Dutch-Shell Cuban subsidiary, is planning to erect a new refinery in Cuba, but size and other details were not given.

PUERTO RICO

Area, sq. miles	3,435	Population	2,210,703
Capital		San Juan	

BARBADOS (BRITISH)

Area, sq. miles	116	Population	205,000
Capital		Bridgetown	

COSTA RICA

Area, sq. miles	23,000	Population	825,000
Capital		San Jose	

BRITISH HONDURAS

Area, sq. miles	8,867	Population	65,000
Capital		Belize	

Netherlands West Indies . . . The islands of Aruba and Curacao in the Netherlands West Indies are the location of the world's largest export refineries, a position which was held by the Abadan refinery in Iran prior to the 1951 nationalization and shutdown. The Aruba refinery of Lago Oil & Transport Co., Ltd. (Standard Oil Co, [N.J.]), and the Curacao refinery of N. V. Curacaosche Petroleum Industries Mij. (Royal Dutch-Shell) operate on crude from the nearby Venezuelan mainland. The 30,000-bbl.-daily refinery which Shell operated at Arend in Aruba was closed down 2 years ago. The Lago company this year placed a 40-ton-daily sulfur-recovery unit and gas-purification plant in operation at the refinery. Neither of the two N.W.I. refineries has catalytic cracking facilities, but Shell has announced plans to construct a fluid unit of about 35,000 bbl. daily at Curacao, with completion due late in 1957 or early 1958.

Barbados . . . Gulf Exploration Co. obtained a concession in 1950 covering about half the 166-sq. mile area of this British island. One well was completed in the Turner Hall area in the northwest section of the island. It produced small amounts of gas and was shut in. The second well was undertaken this year. This test, Ince 1, was drilling below 5,000 ft. late in the fall. The location is in the southeast part of the island. The National 130 rig being used in Barbados was moved in from the company's operations in Cuba.

Costa Rica . . . Cia. Petrolera de Costa Rica, Ltd., in which Union Oil Co. of California is a partner, commenced drilling this fall on its first well in Costa Rica. The test, first of three projected, is 1 Patino, in the southern part of Limon Province on the Atlantic side of the country. Preliminary work including geological field studies, aerial photography, and aerial magnetometer has been under way since 1951. The concession agreement committed the company to spend at least $200,000 the first 2 years and the same sum the second 2 years.

British Honduras . . . Bahamas Exploration Co., Ltd., (Gulf) was granted an exploratory concession over 12,000 sq. miles in British Honduras in 1949. The company has done considerable preliminary work, including seismograph, and is planning to commence a well in the country after the first of the year when the rainy season ends.

Guatemala . . . This country was closed to foreign oil capital during the several years its government was dominated by Communist elements. Last summer's revolution installed a new regime which may be receptive to foreign exploratory offers, though changes in the country's laws presumably would have to be made. Union Oil Co. of California the latter part of this year was reported to have held preliminary discussions with the Guatemalan Government on possible exploration rights.

United States Territories

ALASKA

Area, sq. miles	586,400	Population	128,643
Capital		Juneau	

AN increasing amount of exploratory work by private companies is taking place in Alaska. Major companies as well as local Alaskan firms, some of which advertise dollar-a-share stock in newspapers, are participating. The territorial commissioner of mines estimated that about $4,000,000 had been spent during the last 3 years by private oil operators and that another $2,000,000 would be invested in 1954.

Some of the programs are aimed as much at finding gas as oil. The two centers of population, Fairbanks and Anchorage, are interested in obtaining natural-gas supplies because of the present high costs of imported fuel. There has been active consideration of a plan to construct a $30,000,000 pipeline to carry natural gas into Fairbanks from Gulik field between Fairbanks and Point Barrow on the Arctic coast.

One of the principal Alaskan exploratory programs is

that being carried out by Phillips Petroleum Co. in association with Kerr-McGee Oil Industries, Inc. In 1953, these companies obtained approval from the Department of the Interior of a 10-year development program covering 1,100,000 acres in southern Alaska. The first well in this program, Sullivan Strat 1, located 4 miles north of Icy Cap and 26 miles east of Cape Yakataga, went to 4,837 ft. this year without significant showings of oil or gas. The company prepared an access road to a second location 5 miles west and 2 miles north of the first hole.

Standard Oil Co. of California, which has been interested in Alaskan oil prospects at various times since the 1920's, announced in July that it had one field party continuing geological and geophysical work in South Central Alaska, including the Icy Bay area on the east side of the Gulf of Alaska between Cordova and Yakutat where the company has operating agreements and options from the lessees of 107,000 acres of government land. A second Standard of California party was doing seismograph work on the Kenai Peninsula near Seward.

Besides Phillips and Standard of California, other companies which have been investigating Alaskan prospects include Shell Oil Co. and the Havenstrite interests. The Iniskin Unit Operators, Inc., was formed by a West Coast group headed by R. E. Havenstrite, Los Angeles independent operator, and a rig was shipped to start a wildcat the latter part of the year 150 miles southwest of Anchorage.

Most of the recent exploration in Alaska, aside from the now-abandoned $56,000,000 program which the Navy conducted for 9 years in its Petroleum Reserve 4 on the Arctic Coast, has been along the southern coast of Alaska as distinguished from the southeastern or panhandle region. Private exploration has been encouraged by territorial officials who are hopeful that the Interior Department will cancel the order which withdrew 30,000 sq. miles from the public domain in the mid-'40s and turned it over to the Navy for oil exploration.

There is no commercial production of oil at present anywhere in the Territory of Alaska. Some minor production was discovered in 1901, and 23 shallow holes were drilled to a depth of about 800 ft. in Katalla field near Cordova between 1921 and 1936. Katalla was acquired in 1927 by California Standard. Production never exceeded 50 bbl. daily before the area was depleted with the production of about 155,000 bbl. of high-grade crude.

Work got under way this year on the U. S. Government's 615-mile military products line between the ice-free port of Haines in southeastern Alaska and Fairbanks. The line extends across Canada for 280 miles of its total length. The project is being carried out primarily to provide a safe method of moving strategic military fuels but surplus capacity available in peacetime will be used to carry products for civilian consumption. The 8⅝-in. line is costing approximately $30,000,000.

HAWAII

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Pacific Refiners, Ltd.—Honolulu	(1)			
Standard Oil Co. of California, 225 Bush St., San Francisco—Honolulu	(2)			

(1) Refinery operates on heavy crude oil mixed with butane. (2) Company planning refinery of undetermined size at Honolulu.

Africa

EGYPT

Area, sq. miles	**386,000**	**Value**	**$2.88**
Population	**20,729,000**	**Refining cap., B/D**	**49,000**
Capital	**Cairo**	**Production, B/D**	**37,800**
Currency	**Pound**	**Producing fields**	**6**
Reserves, bbl.		**92,000,000**	

EXPLORATION is being resumed in Egypt after a lapse of several years during which the search for new production was at a standstill. A group consisting of Continental Oil Co., Ohio Oil Co., Cities Service Co., and Richfield Oil Corp., started work on a large concession covering the western part of the country. In the southern Sinai, Southern California Petroleum Corp. was drilling three exploratory wells in the Wadi Feiran area. The two older operating companies in Egypt, Anglo-Egyptian Oilfields, Ltd. (Royal Dutch-Shell) and Socony-Vacuum Oil Co., Inc., reached agreement with the government settling long-standing legal differences blocking exploratory work by these companies.

The action finally taken by Egypt to allow new ex-

EGYPT PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, A.P.I.	Geological data or prod. formation
Asl	1948	2,870-3,870	5		1		6,529	22,035,113	22	Eocene limestone
Gemsa	1908	400-2,000			1			1,422,098	41	Miocene limestone
Hurghada	1913	700-2,500		23			711	38,422,161	22-30	Cret. ss., Mio. cong.
Ras Gharib	1938	1,200-2,500	7	83	32	1	24,948	124,127,568	25-26	Cret.ss., Mio. ls.
Ras Matarma	1948	1,940-3,200			3				20	Eocene limestone
Sudr	1946	1,500-3,100	9	4	1		5,923	22,599,270	19-23	Eoc. ls., Mio. ss., ls.
Total Egypt			21	110	38	1	38,111	208,606,210		

EGYPT REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Anglo-Egyptian Oil Fields, Ltd., Shell House, 6 Sharia Tewfic, Cairo—Suez	40,000		6,400	
Raffinerie de Petrole du Government, 18 Rue Fouad Ier, Alexandria—Suez	9,000			
Total Egypt	49,000		6,400	

ploratory work came as the existing fields in the Sinai were beginning to show signs of depletion. The development of Asl and Sudr, two discoveries made shortly after the end of World War II, resulted in a rise in Egyptian production to a rate of around 46,000 bbl. daily. However, industry officials had made it plain to the government that these fields, owing to porous formations and high water drive, would go into sudden and abrupt decline. This began to occur toward the end of 1953 when Asl's output fell back rapidly, and the country's total production was reduced to its present rate of around 38,000 bbl. daily.

Anglo-Egyptian and Socony-Vacuum found the terms of the mining and companies laws passed in Egypt in 1947 and 1948 so objectionable that their exploratory operations were gradually cut back and drilling confined to proved areas on which confirmed leases were held. The two companies operate jointly in the Sinai area, while Anglo-Egyptian holds alone the older fields west of the Gulf of Suez. The points of dispute with the government mainly concerned the pricing formula for domestically produced oil, the status of 61 licenses held by the companies, and the grant of a lease for the Sinai discovery at Ras Matarma.

Under the settlement announced last July, the companies agreed to initiate a program over the next 3 years providing for an outlay of $5,600,000 on exploration. Another large investment is to be made on modernization work at Anglo-Egyptian's refinery at Suez. The capital of Anglo-Egyptian was doubled to nearly $11,200,000, and the agreement gave the government the right to acquire 10 per cent of its stock.

The new concession in the western part of Egypt was negotiated early this year by Conorada Petroleum Corp. and covered 80,000 sq. miles of the Western Desert, including an offshore area. Subsequently it was taken over by two of Conorada's parent companies, Continental and Ohio, and Cities Service and Richfield were brought into the venture. Continental and Ohio each hold 27½ per cent, and Cities Service and Richfield, 22½ per cent. Cities Service later acquired a concession over a smaller area of about 15,000 sq. miles adjoining the Western Desert concession to the east.

Big Program in Western Desert

A large-scale and extensive program was launched in the Western Desert by the Continental-administered operating company, Egyptian American Oil Co., headed by Millard Neptune, formerly president of Platte Pipe Line Co. Two seismograph parties were moved into the field, along with four surface-geological parties, and an aerial photographic-photogeological survey was arranged. First drilling by this company was expected sometime during 1955.

Terms of the concession obtained by Conorada require that at least $8,000,000 be spent in exploration during the next 6 years. The agreement is a special contract negotiated within the framework of the 1953 Egyptian Petroleum law which provided more liberal terms for the Western Desert in an effort to encourage exploration in this section. The concession has a term of 30 years, renewable for 30 years, and provides a royalty of 15 per cent, rising to 25 per cent at the end of 10 years after the commencement of production. The government has a call on 20 per cent of the production.

The Western Desert is a virtually untested part of Egypt. One attractive feature is that it fronts on the Mediterranean and is near major world markets.

International Egyptian Oil Co., Inc., for which Southern California Petroleum Corp. is the operator, is a company in which approximately 70 per cent interest is held by a group of Swiss financial and banking firms. It began work in 1953 in the southern part of the Sinai Peninsula after obtaining rights from the government over an area which included Wadi Feiran where Standard Oil Co. of Egypt (Standard Oil Co. [N. J.]), made a discovery in 1949 before it abandoned its Egyptian operations in the face of the unfavorable legal situation.

The rigs and other equipment formerly owned by the Jersey Standard affiliate were acquired by International Egyptian and placed in operation by Southern California. The company drilled a second well at Feiran which tested initially at a rate of around 2,500 bbl. daily of 23.8°-gravity crude. Other wells were undertaken on three neighboring structures. The company erected field tankage and built a temporary tanker loading terminal on the Gulf of Suez a short distance to the west of the field. It expected to begin commercial production of the area the latter part of this year after separate tankage had been provided at the Egyptian Government's Suez refinery.

EAST AFRICA

ETHIOPIA			
Area, sq. miles	350,000	Population	15,000,000
Capital		Addis Ababa	
BRITISH SOMALILAND			
Area, sq. miles	68,000	Population	500,000
Capital		Hargeisa	
SOMALIA (FORMERLY ITALIAN SOMALILAND)			
Area, sq. miles	194,000	Population	1,300,000
Capital		Mogadiscio	
TANGANYIKA (BRITISH)			
Area, sq. miles	362,688	Population	7,800,000
Capital		Dar es Salaam	
KENYA (BRITISH)			
Area, sq. miles	224,960	Population	5,555,000
Capital		Nairobi	
MOZAMBIQUE (PORTUGUESE)			
Area, sq. miles	297,731	Population	5,090,294
Capital		Lourenco Marques	
MADAGASCAR (FRENCH)			
Area, sq. miles	241,094	Population	4,350,700
Capital		Tananarive	

A HALF dozen exploratory programs are in different stages of progress in the countries, colonies, and territories making up East Africa. American, British, Dutch, Italian, and French companies are participating in the work.

In British Somaliland, Conorada Petroleum Corp. is carrying on geophysical work on the large (36,000-sq. mile) concession it holds in this country. It is likely that the Conorada program will advance into the drilling stage next year. The California company, Moriqui Oil Co., is doing surface geological studies on another British Somaliland concession covering 12,000 sq. miles.

Rights over virtually all the Italian-administered United Nations trust territory of Somalia (formerly Italian Somaliland) are held by two companies. One of these is the Italian Government entity, AGIP, and the other is Sinclair Somal, owned half by Sinclair Oil Corp., and the rest by the Conorada parent companies, Continental Oil Co., Ohio Oil Co., and Amerada Petroleum Corp. AGIP is expected to undertake drilling in the near future. Sinclair Somal is making preliminary geological and geophysical studies.

Ethiopia granted a concession to Sinclair Petroleum Co. in 1945, and the company has since drilled two wells

in the eastern part of the country. The last of these, at Galadi, was suspended more than 2 years ago below 9,000 ft., and the middle of this year, Sinclair inaugurated a program of drilling a series of medium-depth holes for geological information. These wells were to be drilled about 40 miles apart in the area of the two unsuccessful deep tests.

The coastal section of Mozambique is held under concession by D'Arcy Petroleum Co., Ltd. (Anglo-Iranian) and Shell jointly. Preliminary seismograph and geological work has been completed for the drilling of a test well on the Island of Mafia off the coast of Tanganyika. D'Arcy-Shell Petroleum Development Co. of Tanganyika, Ltd. also carried out geological work on Zanzibar, Pemba, and in the coastal belt of Kenya.

Mozambique Gulf Oil Co. (Gulf) in 1953 drilled two unsuccessful wells in the southern part of its 46,000-sq. mile concession in southern Mozambique. One of these wells went to 10,455 ft., but neither encountered evidence of oil or gas.

Exploratory work in the French island of Madagascar off the East coast of Africa is by Soc. des Petroles de Madagascar. In northwestern Madagascar, core-hole examinations have been continued of asphalt impregnations which have been known for many years. S.P.M. has drilled several wells in the southwestern part of the island but with negative results.

NORTH AFRICA

ALGERIA (FRENCH)

Area, sq. miles	847,552	Production, B/D	1,600
Population	8,676,016	Producing fields	1
Capital	Algiers	Reserves, bbl.	5,000,000

MOROCCO (FRENCH)

Area, sq. miles	172,104	Refining cap., B/D	2,100
Population	10,442,000	Production, B/D	2,400
Capital	Rabat	Producing fields	11
Reserves, bbl.	15,000,000		

TUNISIA (FRENCH)

Area, sq. miles	43,313	Population	3,231,000
Capital	Tunis		

LIBYA

Area, sq. miles	1,100,000	Capital	Tripoli
Population	1,340,000	Currency	Pound
Value	$2.83		

THE four main countries bordering North Africa are attracting a high degree of exploratory interest. Three of these areas are French controlled, and in them the work is predominantly by French companies. In the fourth Lybia, an independent kingdom created by the United Nations out of former Italian territory, an oil law is being drafted, and several large companies are expected to take out acreage next year.

The only crude production in Africa, outside of Egypt, comes from Algeria and French Morocco in North Africa. The output is as yet small but further exploration is being aggressively carried forward. In French Morocco, the operating company, Soc. Cherifienne des Petroles, processes the local production in a small refinery. Improvement work has been under way at the refinery, and the middle of this year a small T.C.C. catalytic cracking unit of about 3,200 bbl. daily was placed in operation at the plant.

The only foreign company engaged in exploration in French North Africa is Royal Dutch-Shell which holds concessions, in partnership with French interests, in both Tunisia and in southern Algeria in the Sahara Desert. Gulf completed an exploration program in Tunisia this year without success. American companies have generally shied away from participation in exploration in French territory because of the stiff concession terms laid down by the French Government.

French Morocco . . . Total production of the group of small fields discovered in French Morocco is gradually increasing as a result of work by C.F.P. The productive structure at the present time is primarily that of Oued Beth where a succession of small pools have been found since 1949. Exploration is principally in the Rharb and Prerif basins. The crude processed at the Petitjean refinery represents 12 to 15 per cent of total French Moroccan oil consumption. Small gas fields have been developed and are furnishing fuel for the refinery and for industry in Port Lyautey.

Algeria . . . One of the most interesting and extensive exploratory operations now under way is that taking place in the sand wastes of the Sahara Desert in southern Algeria. In the northern part of this vast area, concessions are held by Soc. Nationale de Recherches et d'Exploitation

ALGERIA PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Oued Gueterini	1949	550-2,100	5	42	52	3	1,600	1,383,215	38	Ypresian, Lutetian, lime and sandstone

FRENCH MOROCCO PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Midyear drilling	Prod. in bbl.: July dly. avg.	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Ain Hamra	1918	400-4,500		3	12		6	98,140	38	Miocene sand
Bled Eddoum 1	1952	4,300-4,800	7				380	223,560	39	Domerian sand
Bled Eddoum 2	1952	3,800-4,400		9			509	200,050		Liassic lime
Bled Khatara	1953	4,600-5,000	2	6		1	682	106,400		Liassic lime
Bou Draa	1936	600-2,500	1		2			158,520		Liassic lime
Mers el Kharez	1951	4,400-4,600	6				238	310,790	35	Prim. metamorphic
Oued Beth	1947	2,300-4,600	17		2	1	154	821,140	35	Prim. metamorphic
Oued Mellah	1948	1,800	16				155	274,920	35	Prim. metamorphic
Sidi Fili 1	1950	4,500	16				168	845,170	38	Prim. metamorphic
Sidi Fili 2	1952	3,900-4,600	3	2			200	105,100		Liassic sand
Tselfat	1934	300-5,500		2			5	164,390	45	Liassic lime
Total French Morocco			68	22	16	2	2,497	3,308,720		

FRENCH MOROCCO REFINING

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	—Special processing—
Ste. Cherifienne des Petroles, 27 Ave. Urbain Blanc, Rabat—Petitjean	2,100			

des Petroles en Algerie (S.N.REPAL) and by Cie. Francaise des Petroles. S.N.REPAL has a half interest, with Soc. Raffineries Algeriennes, in Soc. des Petroles d'Aumale, which operates Algeria's only field at present—Oued Gueterini, in the northern part of the country. S.N.REPAL holds a concession over some 30,800,000 acres in the Sahara. Cie. Francaise des Petroles is an important French company which holds the 23.75 per cent French interest in Iraq Petroleum Co., Ltd.

South of the S.N.REPAL and C.F.P. concessions are other large areas on which rights have been obtained by two other companies. One of these is Cie. des Petroles d'Algerie (C.P.A.), owned 65 per cent by Royal Dutch-Shell, 30 per cent by the French government company, Regie Autonome des Petroles (R.A.P.), and 5 per cent by the French Government's B.R.P. The other concession-holding company in the southern Sahara is Cie. de Recherches et d'Exploitation de Petrole du Sahara (C.R.E.P.S.), 55 per cent owned by R.A.P., 35 per cent by Shell, and 5 per cent each by S.N.REPAL and B.R.P.

A well drilled by R.A.P. for C.R.E.P.S. south of In Salah found dry gas at 4,590 ft. C.F.P. has been drilling near El Golea and other heavy rigs are in operation in the region of Ghardaia. Operating conditions in the Sahara are said to match anything that can be found in the Middle East. There are a few scattered oases, and drilling is being done near these. Geological and geophysical crews are kept in the desert only a few months before rotation to the coast or to France.

Tunisia . . . A fairly intensive exploration program has been carried out in Tunisia for the last several years, but the only definite result has been the discovery of a single small gas field. Last summer, Gulf abandoned its program in Tunisia after drilling five dry holes and spending some $7,000,000. Gulf had operated in Tunisia through Soc. Nord Africaine des Petroles (S.N.A.P.) in which it held 65 per cent interest.

The other private company in Tunisia, Royal Dutch-Shell (through Sic. Francaise des Petroles de Tunisie (C.P.D.T.) in which it holds 65 per cent interest) indicated plans to continue its program when it asked extension of some of its acreage for an additional 3-year period when the original term expired August 25, 1954. The remaining 35 per cent interest in both the Shell and the Gulf Tunisian companies is held by SEREPT, which is controlled by the French and the Tunisian governments.

The gas field was discovered in 1949 by SEREPT on Cap Bon Peninsula. Construction has commenced on a 4-in. pipeline to move the production to the city of Tunis. Drilling so far has indicated a potential gas production estimated at several million cubic feet daily.

Lybia . . . The United Kingdom of Lybia drafted a new petroleum law with advice from British and American officials. It was due to be placed before the parliament the latter part of this year. The proposed terms appeared to be generally favorable to private foreign capital development. Several major companies, among them Shell, Standard Oil Co. (N.J.), Conorada, Caltex (through American Overseas Exploration, Ltd.), and Socony-Vacuum Oil Co., Inc., are interested in exploratory work in Lybia. The country is largely untested. Some preliminary work was done by Shell in the part of the country that was administered by the British prior to Lybia's independence. French interests have surveyed parts of formerly French-administered Fezzan, now a province of Lybia.

UNION OF SOUTH AFRICA

Area, sq. miles	**472,550**	**Capital**	**Pretoria—Cape Town**
Population	**12,646,275**	**Currency**	**Pound**
Value			**$2.83**

LACKING any indigenous oil production and with unattractive geological prospects, the Union of South Africa is putting some $92,000,000 into the construction of a vast synthetic plant to produce liquid hydrocarbons and chemicals from coal. Construction work was begun in the middle of 1952 and the first gasoline from the plant is now expected to be placed on the market next April. The undertaking is the largest of its kind in the Free World.

Investigations of the possibility of utilizing South Africa's large deposits of cheaply mined coal for synthetic-oil manufacture go back to 1935 when Anglo-Transvaal Consolidated Investment Co., Ltd., made studies in the field and secured the South African rights to the Fischer-Tropsch process. The magnitude of the project was such that the South African Government was brought in and the government-financed South African Coal, Oil & Gas Corp., Ltd., (SASOL) incorporated in September 1951 to carry out the undertaking. Supervision of construction, procurement, and design of many of the individual process units has been by the M. W. Kellogg organization.

The SASOL project involves an integrated facility on a 5,000-acre site at Coalbrook about 50 miles south of Johannesburg. The project includes the opening and mechanized mining of nearby virgin coal deposits to supply 7,600 tons of raw material daily, gasification and reforming units to transform coal into synthesis gas and by-product chemicals, and the complete synthesis plant producing liquid hydrocarbons, oxygenated hydrocarbon chemicals, and waxes.

Justification for Project

The economic justification for the SASOL project rests principally on two factors: (1) the availability of thick seams of coal at shallow depth and (2) the present heavy freight charge for transporting imported gasoline from coastal points to the Johannesburg area. SASOL'S managing director recently stated that the cost of coal at the plant would amount to the equivalent of only 42 cents a ton and that the amount of coal to produce a gallon of gasoline would cost slightly under 3 cents. The cost of transporting gasoline from the SASOL plant to Johannesburg will be about 2½ cents as against about 11 cents for moving imported gasoline from the coast.

Despite these favorable factors, the economics of the project has been sharply questioned. The government turned down a proposal for the construction of a pipeline to move imported gasoline 400 miles from the coast. This, it is said, would bring cost of transportation down to little more than a cent a gallon.

Anticipated initial production of gasoline from SASOL

UNION OF SOUTH AFRICA REFINING

Company and address—Refinery location—	Barrels per stream day— Crude distillation	Cat. cracking	Thermal operations	—Special processing—
Standard Vacuum Refining Co. of South Africa, (Pty.) Ltd., Box 956, Durban, South Africa—Durban	17,300	6,300	2,000	A-240, P-1,225

will amount to about 4,300 bbl. daily. SASOL will sell most of this to the existing distributors, Atlantic (whose Eastern European marketing facilities were bought this year by Anglo-Iranian), Caltex, Shell, and Standard-Vacuum.

The first petroleum refinery in the Union of South Africa was opened early this year at Wentworth adjoining Durban on the East Coast. This Standard-Vacuum plant incorporating the most modern integrated refinery design has a capjacity of 17,300 bbl. per stream day. It operates on Persian Gulf crude oil and meets a substantial part of total South African petroleum demand which this year is expected to average around 40,000 bbl. daily for inland consumption.

Besides these two facilities—the SASOL plant and the Stanvac refinery— South African Torbanite & Refining Co. (SATMAR) refines crude shale oil produced at Ermelo about 140 miles east of Johannesburg. Its refinery at Boksburg near Johannesburg produces about 300 bbl. daily of gasoline.

The union government has from time to time sponsored some preliminary exploration for oil in South Africa but the prospects are not encouraging from a geological standpoint. Early this year, a small amount of crude oil was recovered in a coal mine in the Dundee district of Natal, but further work by the Geological Survey of the Union Department of Mines failed to show any commercial production.

WEST AFRICA

NIGERIA (BRITISH)
Area, sq. miles 338,593 Population 23,973,000
Capital Lagos

ANGOLA (PORTUGUESE)
Area, sq. miles 481,351 Population 4,111,796
Capital Luanda

EQUATORIAL AFRICA (FRENCH)
Area, sq. miles 959,256 Population 4,386,400
Capital Brazzaville

FRENCH WEST AFRICA
Area, sq. miles 1,774,600 Population 16,524,000
Capital Dakar

FRENCH CAMEROONS
Area, sq. miles 166,489 Population 2,997,000
Capital Yaounde

BELGIAN CONGO
Area, sq. miles 904,757 Population 11,259,000
Capital Leopoldville

WIDESPREAD oil exploration is under way in the western part of the African continent, both along the coastal belts and in the interior sedimentary basins. So far the work is being carried out wholly by European companies and no American operators are involved except in a contractor capacity. In most cases, these European companies hold concessions from their own governments for particular colonial territories.

A number of important and interesting oil shows have resulted from drilling in Nigeria, French West Africa, Portuguese Angola, and French Equatorial Africa. However, encouraging though they may be, none of these have as yet given commercial production.

Oil exploration in Nigeria dates back to 1937 when Shell and Anglo-Iranian Oil Co., Ltd., jointly took out a concession. The operating company, Shell-D'Arcy Petroleum Development Co. of Nigeria, Ltd., during the summer tested small quantities of oil along with gas in a well at Ituk Mbang in Calabar Province. Earlier shows were obtained in 1953 at Akata, also in Calabar Province. Further drilling and testing are under way to determine the importance of these finds.

Shows of oil also are reported to have been obtained by the Petrofina affiliate, Cia. de Combustiveis do Lobitos "Purfina" (Carbonang) in drilling in the Portuguese colony of Angola in western Africa. The company is continuing drilling to test several promising structures that have been located. It obtained an exclusive concession over a part of the coastal section of Angola in 1952.

A long-range exploratory program has been undertaken in the central Congo Basin in the Belgian Congo by a syndicate representing the colonial government (holding 40 per cent interest) and nine large Belgian industrial firms, including the refining and marketing company, Petrofina. The discovery of natural gas at Lake Kivu in the eastern part of the Belgian Congo was reported this summer, and Belgian interests are planning to develop the discovery.

Considerable drilling has been done in the coastal section of French Equatorial Africa but no commercial production has been developed. The work is by a company backed by the French Government. The French Government's oil agency, Bureau des Recherches des Petroles (B.R.P.) has been doing reconnaissance work in French West Africa, studying both the coastal and the interior basins. Some oil impregnations were found in a shallow well near Dakar. Exploratory work is the French Cameroons, in the Bonomo district, has resulted in the discovery of several shallow gas sands which are being developed.

Report on Production of Canadian Fields

Province of Alberta

Name of field—	Year of discovery	Proved acres	Depth range, ft.	No. wells: On prod.	No. wells: Shut in	No. wells: Midyear drilling	Prod. in bbl.: Est. first half 1954	Prod. in bbl.: Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Acheson:										
L. Cretaceous zone	1950	400	3,500	5	3	1	99	115,146	37-38	L. Cretaceous ss.
D2 Devonian	1952	400	4,760	10			402	277,662	37-38	U. Devonian
D3 Devonian	1950	3,520	5,075	88			6,179	6,293,869	37-38	U. Devonian
Acheson, East	1953	200	3,969	4		1	90	16,238	37.4	L. Cretaceous ss.
Alliance	1951	200	3,140	5			65	60,890	26	L. Cretaceous ss.
Armisie	1951	400	4,040	6	4		206	245,047	38	L. Cretaceous ss.
Barons	1950	240	4,100	4	2		120	124,007	34	Cret. (Bow Island)
Barrhead	1949	80	3,837		2			4,857	22-24	Mississippian
Bashaw	1951	200	5,826	4	1		89	118,965	38-41	U. Devonian
Battle	1953	320	3,277	8			226	94,702	36-37	L. Cretaceous ss.
Baxter Lake	1946	120	1,935	6			66	75,807	18	L. Cretaceous ss.

CANADIAN PRODUCTION (Continued)

Name of field—	Year of discovery	Proved acres	Depth range, ft.	No. wells: On prod.	Shut in	Midyear drilling	Prod. in bbl.: Est. first half 1954	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Big Valley:										
D2 Devonian	1950	1,400	5,200	33	2		2,019	1,748,008	30-34	U. Devonian
D3 Devonian	1950	280	5,400	7			291	301,812	30-34	U. Devonian
Bonnie Glenn	1952	4,800	6,600	115		4	17,253	9,399,863	35-43	U. Devonian
Bonnyville	1951	460	1,115	13	9		122	98,210	14	Cret. (Colony sd.)
Campbell	1949	600	3,700	8	7		125	234,066	30-33	L. Cretaceous ss.
Cessford	1952	1,120	2,908	24	11		651	205,490	24-27	L. Cretaceous ss.
Chamberlain	1952	200	3,650	3	2		62	64,125	26-27	L. Cretaceous ss.
Chauvin	1952	1,120	2,041	22	5		392	162,054	21-22	L. Cretaceous ss.
Clive:										
D2 Devonian	1951	280	6,130	7			98	85,806	38-39	U. Devonian
D3 Devonian	1952	480	6,302	12			468	201,971	38-39	U. Devonian
Conrad	1944	640	3,200	15	1		333	1,477,202	26	Jur. (Ellis sd.)
Del Bonita	1943	480	5,123	10	2		115	196,438	34-37	U. Mississippian ls.
Dina	1929	200	1,816	3	2		34	127,391	9-14	L. Cretaceous ss.
Drumheller:										
L. Cretaceous	1950	100	4,445	1	2		9	17,226	31-34	L. Cretaceous ss.
D2 Devonian	1951	880	5,376	11			718	483,326	31-34	U. Devonian ls.
Duhamel:										
D2 Devonian	1950	600	4,500	14	1		672	530,706	34-35	U. Devonian
D3 Devonian	1950	520	4,700	13			773	797,209	34-35	U. Devonian
Ellerslie	1950	300	3,850	5	1		130	130,859	30	L. Cretaceous ss.
Erskine	1953	880	5,374	20	1	1	500	142,993	28-29	U. Devonian
Excelsior:										
L. Cretaceous	1953	40	3,239	1			4	3,189	35-36	L. Cretaceous ss.
D2 Devonian	1949	1,400	3,760	34	1		2,822	3,496,625	35-36	U. Devonian ls.
Fairydell-Bon Accord:										
D2 Devonian	1949	500	3,580	11			331	301,201	27-36	U. Devonian
D3 Devonian	1953	400	4,005	8	1		339	141,905	27-36	U. Devonian
Fenn-North Big Valley:										
D2 Devonian	1951	61	5,150	184			12,210	5,010,663	30-33	U. Devonian
D3 Devonian	1952	10	5,305	1			12	10,847	30-33	U. Devonian
Glen Park:										
L. Cretaceous	1953	15	4,627	3*			76	31,879	38-44	L. Cretaceous ss.
D2 Devonian	1951	15	5,525	1			43	52,425	38-44	U. Devonian
D3 Devonian	1951	120	6,200	12			1,014	839,845	38-44	U. Devonian
Golden Spike:										
D2 Devonian	1949	35	5,050	7	1		259	173,161	36-38.3	U. Devonian ls.
D3 Devonian	1949	520	5,980	7	2		5,276	5,288,843	36-38.3	U. Devonian ls.
Hamilton Lake	1953	680	2,948	17			227	82,722	31-34	L. Cretaceous ss.
Joarcam	1949	18,520	3,236	443	11	2	13,233	10,231,566	36-38	L. Cretaceous ss.
Joffre	1953	1,560	4,880	35	1	1	923	195,073	36-40	L. Cretaceous ss.
Jumping Pound[1]	1944	.....	10,000	5	3		313	271,227	51-57	U. Mississippian ls.
Leduc-Woodbend:										
L. Cretaceous	1948	480	4,200	28	2		828	1,430,243	35-42	L. Cretaceous ss.
D2 Devonian	1947	28,640	5,100	680	30		22,136	29,481,647	35-42	U. Devonian
D3 Devonian	1947	21,360	5,300	521	9		32,913	57,396,935	35-42	U. Devonian
Legal	1952	280	2,755	5	2		175	121,844	30-31	L. Cretaceous ss.
Lloydminster[2]	1939	4,000-5,000	1,920	138	236		2,789	6,114,819	9-17	L. Cretaceous ss.
Malmo:										
L. Cretaceous	1952	360	4,472	8	1		236	144,266	34-40	L. Cretaceous ss.
D2 Devonian	1952	1,160	4,910	28	1		1,074	749,143	34-40	U. Devonian
D3 Devonian	1952	600	5,200	13	2		567	388,640	34-40	U. Devonian
Morinville:										
L. Cretaceous	1952	.....	3,541	1			1	5,224	32-36	L. Cretaceous ss.
D1 Devonian	1953	.....	3,807	1			25	4,529	32-36	U. Devonian
Namao	1951	640	3,645	8	8		174	157,763	28	L. Cretaceous ss.
New Norway:										
L. Cretaceous	1953	.....	3,672	.....	1		.....	1,213	32-39	L. Cretaceous ss.
D2 Devonian	1951	400	4,575	10	.....		671	592,795	32-39	U. Devonian
D3 Devonian	1951	240	4,850	5	1		173	191,880	32-39	U. Devonian ls.
Peavey	1953	360	3,499	7	4		165	97,168	30	L. Cretaceous ss.
Pembina	1953	6,400	5,000	7	10	3	384	108,403	37.5-38	U. Cretaceous ss.
Pincher Creek[1]	1948	.....	11,755	0	2		.....	29,288	53-54	U. Mississippian ls.
Princess:										
L. Cretaceous	1941	680	3,170	.....	3		1	†841,233	24	L. Cretaceous ss.
Mississippian	1945	.....	3,300	2	7		39	.....	24	U. Mississippian
Devonian	1944	.....	3,985	.....	5		.....	.....	32	U. Devonian
Redwater	1948	37,536	3,200	899	25		59,190	96,665,254	33-36	U. Devonian ls.
Rimbey	1953	1,440	7,893	8	.....		449	123,642	43-44	U. Devonian (D3)
Samson	1951	160	4,722	3	1		51	24,234	27.5-28	L. Cretaceous ss.
Skaro	1952	160	2,723	.....	4		11	18,528	37	U. Devonian
Spring Coulee	1950	160	6,000	2	2		14	30,564	35-37	U. Mississippian ls.
Stettler:										
L. Cretaceous	1949	.....	4,250	2	.....		31	59,371	27-30	L. Cretaceous ss.
D2 Devonian	1949	2,640	5,100	55	10	1	1,985	1,649,794	27-30	U. Devonian
D3 Devonian	1949	1,160	5,330	25	4		864	722,497	27-30	U. Devonian
Sturgeon Lake	1953	640	.....	.....	7	1	55	27,100	37	U. Devonian
Taber	1942	800	3,200	10	10		199	1,673,240	33	L. Cretaceous ss.
Turner Valley:										
Shallow	1913	120	3,100	2	1		6	525,178	37-41	L. Cretaceous ss.
Limestone	1924-1936	21,000	3,450-9,150	229	95		5,757	106,788,207	37-41	U. Mississippian ls.

CANADIAN PRODUCTION (Continued)

Name of field—	Year of discovery	Proved acres	Depth range, ft.	No. wells: On prod.	Shut in	Midyear drilling	Prod. in bbl.: Est. first half 1954	Accum. to July 1	Gravity, °A.P.I.	Geological data or prod. formation
Vermilion	1939	320	1,850		29		7	1,347,277	7-10	L. Cretaceous ss.
Wainwright	1923	1,120	2,250	22	6	2	239	459,019	20	L. Cretaceous ss.
West Drumheller:										
D2 Devonian	1952	2,520	5,475	54		1	2,574	1,014,460	40-43	U. Devonian
D3 Devonian	1953	280	5,645	7			260	47,189	40-43	U. Devonian
Westerose	1952	1,440	6,818	17			2,934	1,556,444	40-42	U. Devonian
Whitelaw	1950	40	3,880		1			11,290	26	Triassic ss.
Whitemud	1949	160	4,055	3	1		43	143,844	35	L. Cretaceous ss.
Wizard Lake:										
L. Cretaceous	1952	40	4,794		1			612	38	L. Cretaceous ss.
D3 Devonian	1951	1,840	6,000	47	2	1	8,350	6,484,454	38	U. Devonian
Total Alberta				4,091	601	121	214,759	367,292,565		
Province of Saskatchewan										
Birling	1948		1,500		6					L. Cretaceous ss.
Cantuar	1952		3,200	10	12		170	49,213	12-23	L. Cret., Jur. ss.
Coleville-Smiley:										
Buffalo Coulee	1952		2,700	22	5		186		13	Miss. (Banff) ss.
Coleville	1951		2,700	90	3		2,335		14	Miss. (Banff) ss.
Coleville-Smiley	1953		2,308	66	18		1,625	318,774	30	L. Cret. (Viking) ss.
Dollard	1953		4,600	6	11		241	68,069	23	Jurassic ss.
Eastend	1953		4,700		6			21,344	21	Jurassic ss., ls.
Fosterton	1952		3,100	18	26		118	108,200	24	L. Jurassic ss., ls.
Gull Lake	1952		3,875	20	12		829	210,386	22.6-23.4	L. Cret., Jur. ss., ls.
Java	1953		3,300	3	1		5	1,616	12.5	L. Cret., Jur. ss., ls.
Lloydminster[2]	1939		1,900	134	75		2,196		8-16	L. Cretaceous ss.
Lone Rock	1947		1,875	106	32		1,795		5-18	L. Cretaceous ss.
Maidstone	1949		1,550	3	8		31	26,568	12-13	L. Cretaceous ss.
Marsden	1929		1,800	9	2		92	102,055	8-13	L. Cretaceous ss.
McLaren	1950		1,660	2	24		11		8-15	L. Cretaceous ss.
Midale	1953		4,650	8	3		254	60,852	27	Mississippian ls.
North Premier	1953		3,200	1	8		2		23	L. Cret., Jur. ss.
Rapdan	1953		4,600		4			23,633	23	Jurassic ss.
Success	1952		3,200	17	24		644	240,011	22.6	L. Cret., Jur. ss.
Wapella	1952		2,350	10	12		414	178,675	26-27	L. Cret., Jur. ss.
Waseca	1950		1,670		7		6		8-15	L. Cretaceous ss.
Total Saskatchewan				525	299	47	10,954	1,409,396		
Province of Manitoba										
Daly	1951		2,200				2,781	1,188,268	33	Mississippian ls.
Virden-Roselea	1953		2,082				1,199	272,990	35	Mississippian ls.
North Virden-Roselea	1953		2,081				252	45,522	34	Mississippian ls.
Whitewater	1953		2,492				74	13,355	34	Mississippian ls.
Total Manitoba				212	14	10	4,306	1,520,135		
Province of Ontario										
Province of Ontario	1859		500-3,000	1,423	672		1,092	32,352,151	26-39	Ord., Sil., Dev. ls.
Province of New Brunswick										
Stony Creek	1909		1,000-3,200	39			35	551,092	37	Mississippian ss.
Northwest Territories										
Norman Wells	1920		1,050-1,900	25	40	1	1,131	2,128,101	39	Devonian ls.
Total Canada				6,315	1,612	179	232,277	405,253,440		

1. Distillate field. 2. Field occurs in both Alberta and Saskatchewan. 3. Figure includes all three zones.

Report on Canadian Refineries

Alberta

Company and address—Refinery location—	Barrels per stream day: Crude distillation	Cat. cracking	Thermal operations	Special processing
Anglo-American Exploration, Ltd., 301 Lancaster Bldg., Calgary—Hartell	4,000		1,500	P-70
Bonnyville Oil Refineries, 1520 Mountain St., Montreal—Bonneville	1,000			
British American Oil Co., Ltd., Royal Bank Bldg., Toronto 1, Ont.:				
Calgary	7,200		2,500	R-2,000, A-240, V-2,500
Edmonton	7,200	2,000	3,500	C-56
Excelsior Refineries, Ltd., Lloydminster—Lloydminster	2,500			V-1,500, A-1,400
Husky Oil & Refining, Ltd., 302 Grain Bldg., Saskatoon, Sask.—Lloydminster	10,000			V-1,400, P-1,200,

CANADIAN REFINING (Continued)

Company and address—Refinery location—	Barrels per stream day: Crude	Cat.	Thermal	
Imperial Oil, Ltd., 56 Church St., Toronto, Ont.:				A-5,000
Calgary	10,212		5,100	A-738
Edmonton	27,750	10,650	10,100	
McColl-Frontenac Oil Co., Ltd., Royal Bank Bldg., West Montreal—Edmonton	11,000	2,600	5,200	P-250, C-60
Wainright Producers & Refiners, Ltd., Wainwright—Wainwright	[1]4,000			
Total Alberta	84,862	15,250	27,900	

(1) Plant, destroyed by fire in January 1954, is being rebuilt.

British Columbia

Imperial Oil, Ltd., Toronto—Ioco	25,000	12,765		A-668
Royalite Products, Ltd., 239 Sixth Avenue West, Calgary, Alta.—Kamloops	5,000	1,350		P-400, V-7,000, A-500
Shell Oil Co. of Canada, Ltd., Montreal East, Que.—N. Burnaby	27,000	8,700	4,500	P-400, A-550, V-7,000
Standard Oil Co. of B.C., Ltd., Marine Bldg., Vancouver—N. Burnaby	11,000	3,700		P-800
Total British Columbia	68,000	26,515	4,500	

Manitoba

Anglo-Canadian Oils, Ltd., 301 Lancaster Bldg., Calgary—Brandon	3,000			C-1,375, P-50
Imperial Oil, Ltd.—Winnipeg	13,320	5,772		A-300
North Star Oil, Ltd., 303 Scott Block, Winnipeg—St. Boniface	13,000		2,000	R-8,000
Radio Oil Refineries, Ltd., Monroe and Watts St., East Kildonan, Man.—East Kildonan	500			
Total Manitoba	29,280	5,772	3,375	

New Brunswick

New Brunswick Oilfields, Ltd., P.O. Box 194, Moncton, N. B.—Weldon	300			

Northwest Territory

Imperial Oil, Ltd.—Norman Wells	1,388			

Nova Scotia

Imperial Oil, Ltd.—Halifax	[1]24,420		11,100	A-1,034

(1) Company adding 41,250-bbl. distillation unit. Also adding 27,000-bbl. cat. cracker.

Ontario

British American Oil Co., Ltd.—Clarkson	17,000	11,600	4,500	R-8,500, V-6,000
Canadian Oil Refineries, Ltd., 204 Richmond St. West, Toronto, Ont.—Corunna	25,000	10,000	3,000	R-4,000, P-1,200, V-7,500
Imperial Oil, Ltd.—Sarnia	79,365	27,861	49,950	P-4,884, A-3,330
Husky Oil & Refining, Ltd. (Plant formerly owned by Riverlake Oils, Ltd.)—Fort Williams	2,500			R-1,200
Sun Oil Co., Philadelphia—Sarnia	16,650	12,210		R-3,330
Trinidad Leaseholds (Canada), Ltd., 184 Bay Street, Toronto—Port Credit	7,500		4,200	R-1,500
Total Ontario	131,365	61,671	61,650	

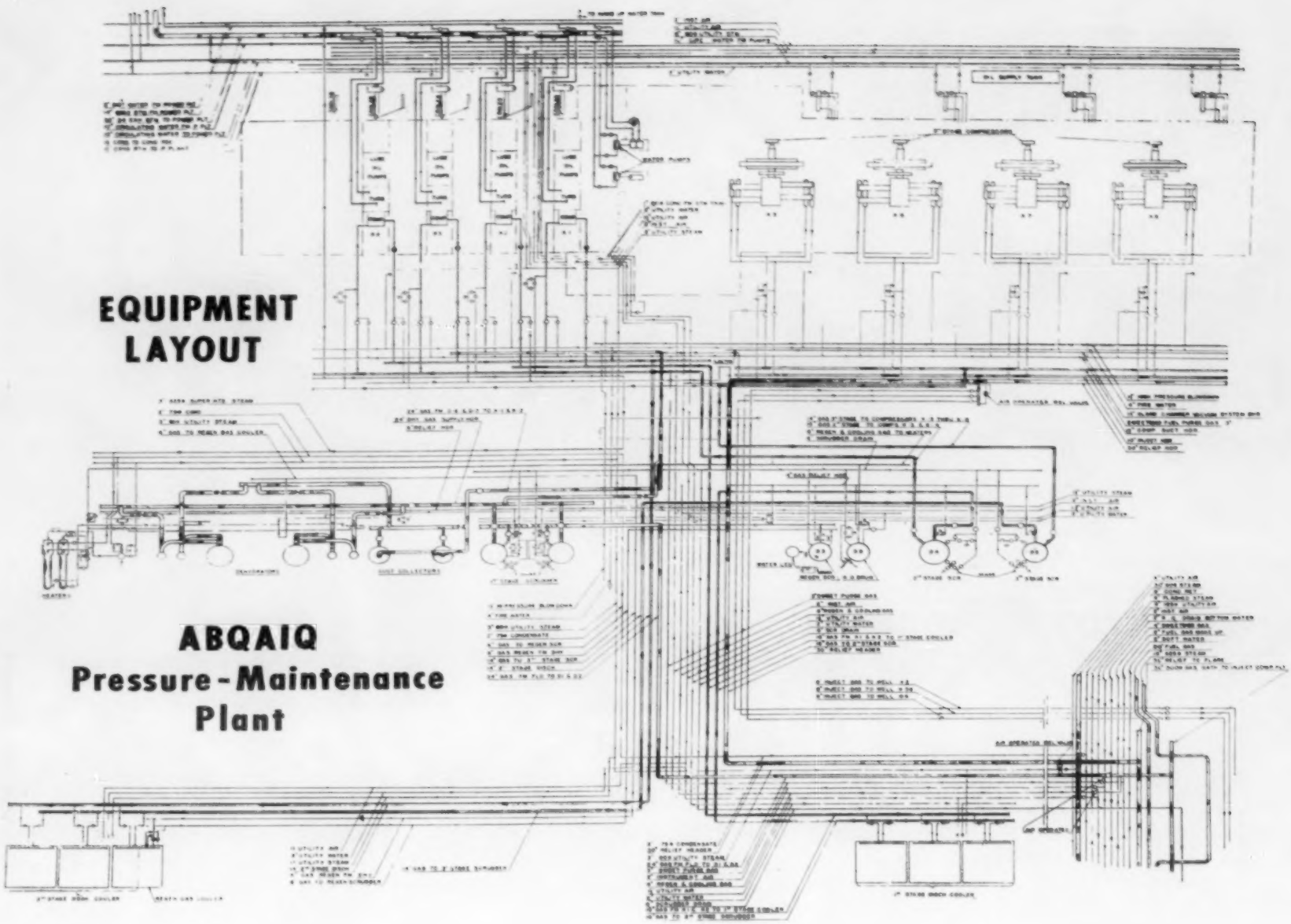
Quebec

British American Oil Co., Ltd.—Montreal East	45,000	17,500	3,500	V-12,000, P-750, L-300, A-3,200
Canadian Petrofina, Ltd., Montreal—Montreal	(1)			
Imperial Oil, Ltd.—Montreal East	51,060	16,300	25,873	P-4,884, A-3,330
McColl-Frontenac Oil Co., Ltd.—Montreal East	43,000	16,000	18,300	P-1,500
Shell Oil Co. of Canada, Ltd.—Montreal East	44,000	16,000	8,000	P-1,100, V-19,000
Total Quebec	183,060	65,800	55,673	

(1) Building 20,000-bbl. refinery.

Saskatchewan

British American Oil Co., Ltd.—Moose Jaw	15,000	4,500	4,000	V-5,000, P-500, C-90, A-435
Consumers Co-Operative Refineries, Ltd., 211 Avenue D North, Saskatoon, Sask.—Regina	12,000	5,000		V-6,500, P-500
Royalite-Hi-Way, Ltd., 239 Sixth Avenue West, Calgary, Alta.—Saskatoon	6,500	2,600	3,840	P-260, A-600
Imperial Oil, Ltd.—Regina	22,500	7,500	11,766	P-333, A-428
Moose Jaw Refineries, Ltd., P.O. Box 280, Moose Jaw—Moose Jaw	2,000			A-1,000
Northern Petroleum Corp., Ltd., Kamsack, Sask.—Kamsack	800			
Prince Albert Refineries, Ltd. (Owned by Royalite)—Prince Albert	1,000			
Royalite Products, Ltd.—Coleville	5,000			A-1,000
Total Quebec	64,800	19,600	19,606	
Total Canada	587,475	168,093	183,804	


EQUIPMENT
LAYOUT
ABQAIQ
Pressure-Maintenance
Plant

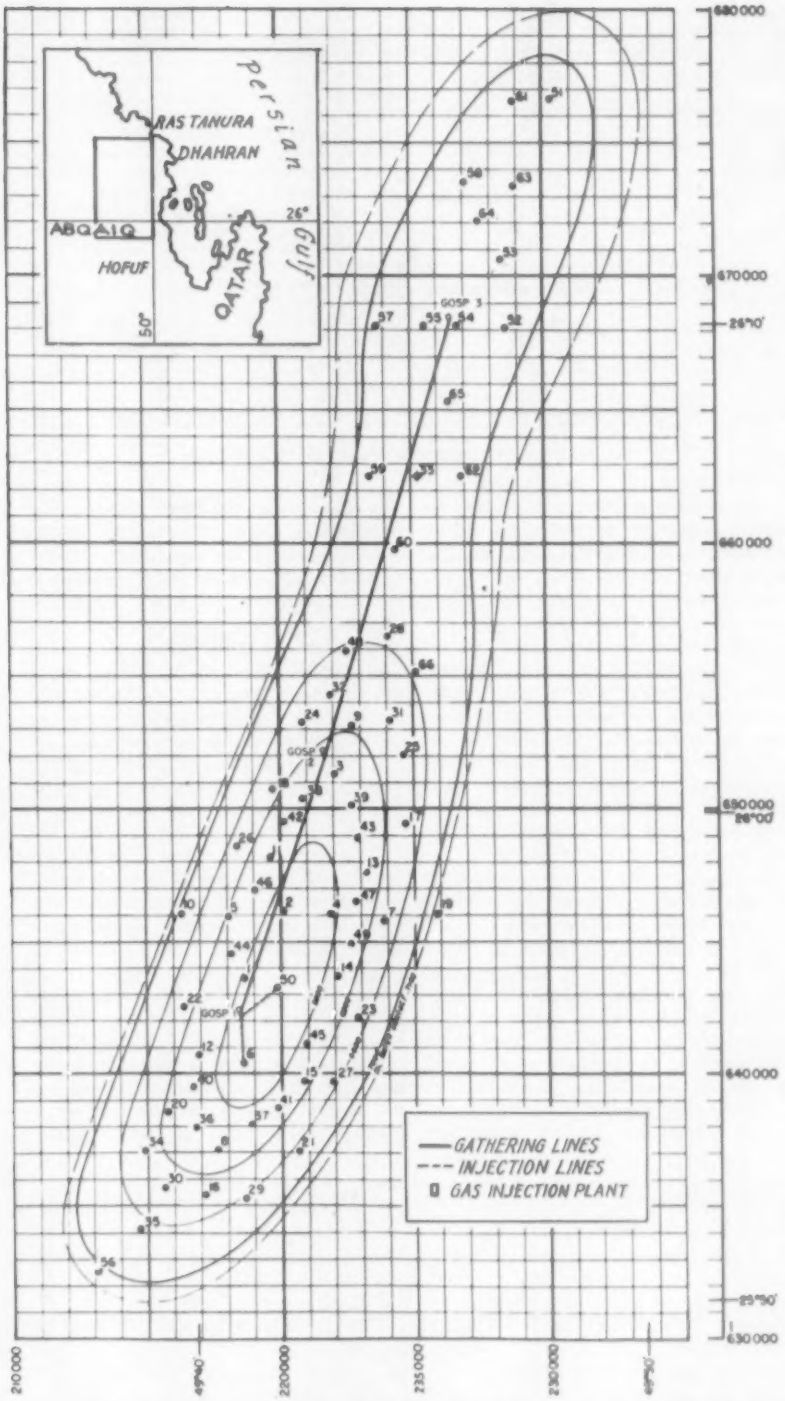


Fig. 1—Abqaiq is a large anticline, 25 miles long and 6 miles wide, with about 90,000 productive acres. The reservoir is a clastic limestone, averaging 200 ft. thick.

Pressure Maintenance At Abqaiq

First installation for a Middle East reservoir is both a conservation and economic measure

by J. J. Johnston and D. R. Fate

The fabulous nature of oil reservoirs in the Middle East has been reported on numerous occasions by various authors; however, infrequently is it brought out that properly producing such accumulations is fraught with numerous problems. Many people are greatly surprised when they are informed that pressure-maintenance operations are being instigated in some of the large fields which lie in this area. The purpose of this paper is to describe the gas-injection operation which has been initiated for Abqaiq field in Saudi Arabia.

GAS injection into Abqaiq field in Saudi Arabia was begun early in 1954. This was the culmination of extensive study and planning. Early in the development of the reservoir it was contemplated that external support must be provided to the available natural energies if suitable recovery was to be obtained from the reservoir. Its great areal dimensions with proportionately small thickness of formation foretold this requirement. The injection of gas into Abqaiq is both a conservation measure and an economically sound venture.

Structure and Pay Formation

Abqaiq is an anticlinal structure covering nearly 90,000 acres, being approximately 25 miles long and 6 miles wide. Fig. 1 illustrates the structural features. The producing formation is predominantly a clastic limestone, consisting of well to poorly cemented oolites and limestone fragments interspaced with dolomitic and crystalline limestone layers. The formational properties are of an intergranular nature and do not display fracture characteristics, such as the nearby fields of Iraq and Iran. The total formational thickness averages 200 ft. with the effective thickness being somewhat less.

Sixty-six wells were drilled in the exploration and development of Abqaiq field. Of these, 59 were initially completed as producing wells; the others were either observation wells or dry holes. Today a total of only 41 of these

original wells are considered producible. Eighteen wells have been shut in for gas-oil-ratio-control purposes. Two wells high on the structure have been made into gas-injection wells, Nos. 6 and 50.

Abqaiq field, commencing in 1946, has produced to the present nearly a billion barrels of oil. The history and performance of the field for this period are illustrated in Fig. 2. The rather rapid loss in reservoir pressure early in the life of the field is evident in this figure. Volumetric-balance studies demonstrated, though, that appreciable water influx was occurring. Initially, the reservoir was some 800 psi. undersaturated, thus no adverse reservoir conditions developed during this period. Recombination samples of reservoir fluid had found the saturation pressure to be approximately 2,550 psig., which was later confirmed with subsurface samples.

Of general concern during this period of substantial loss in reservoir pressure was the accompanying decline in well potential. Fig. 3 presents the average trend in this respect. Herein it may be noted that for each 100 psi. decline in reservoir pressure there was a corresponding loss in well potential of slightly more than 1,000 bbl. per day. This feature assumes importance when it is realized that as a usual practice wells are produced at their maximum potential unless reservoir conditions, such as proximity to gas or water, necessitate curtailment of production to forestall drawing into the well either of these fluids.

Under the condition of declining reservoir pressure and associated well potential, it was self-evident that an increasing number of wells must be provided to meet a constant production demand. Wells in Abqaiq average about 6,800 ft. in depth and with their attendant gathering system cost nearly a half million dollars each. Thus, it

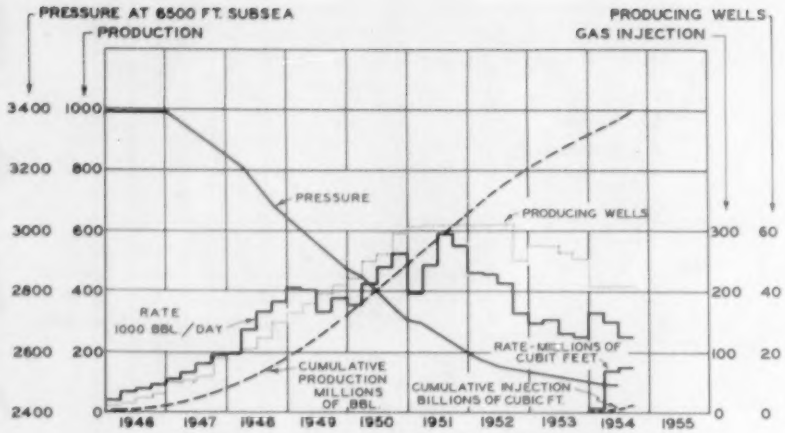


Fig. 2—Reservoir production history of Abqaiq fie'd.

was apparent that continued decline in reservoir pressure at the early rapid rate would soon lead to major expenditures in new wells.

Abqaiq at this time was the prime source of production in Arabia; Ghawar had not as yet been explored to any extent; thus it was of concern whether expenditures for wells alone was wise and necessary. It took little study to realize that the addition of wells for maintaining high withdrawals from Abqaiq would be difficult to support as a sound venture, especially when other probable sources of production were available.

Gas production . . . Free gas was first liberated in the reservoir about mid-1949. The reservoir pressure had declined to a level at which the pressure on the crest of the structure was less than the fluid saturation pressure. Reasonably uniform pressures had been maintained in the portion of the reservoir south of well No. 28 (see Fig. 1) by proper distribution of withdrawals. Suitable formational properties and the low viscosity of the reservoir oil aided in achieving this condition. Consequently, the pressure in any portion of the structure was dictated by its structural position and was a function of the hydrostatic gradient prevalent; thus, they maintained the development of the saturated portion of the reservoir on a contour basis. The gas-injection activity is fairly well confined to that portion of the reservoir south of well No. 28 for obvious reasons, so we will ignore conditions which existed in the portion of the reservoir north of this well.

The significance of the free-gas liberation is two-fold. First, the characteristic of the pressure-decline curve changes at about the time this occurs. This fact is not readily apparent in Fig. 2, because the pressure given there is a weighted average for the field as a whole and masks the effect. Individual plots of pressure for the north and south portions of the field, however, markedly illustrated a continuing decrease in the pressure-decline rate for the southern portion of the field after mid-1949, although the rate of with-

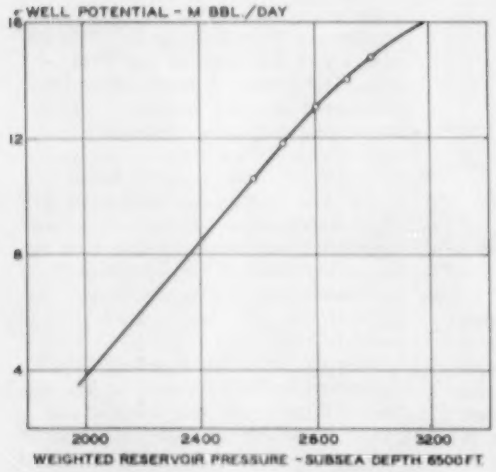


Fig. 3—Pressure-decline curve of Abqaiq field.

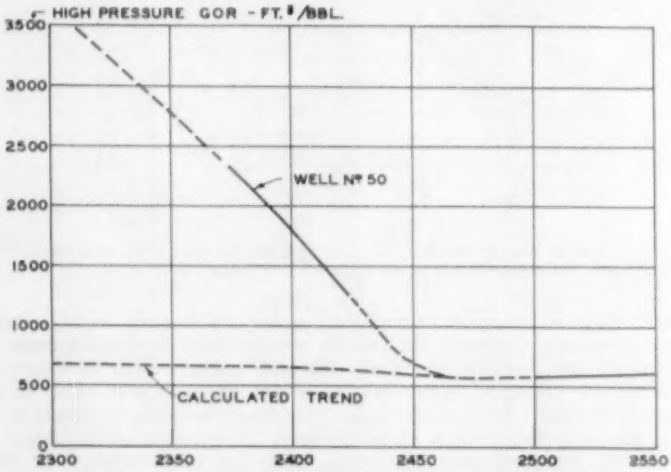


Fig. 4—Reservoir pressure vs. high pressure for Abqaiq field.

THE AUTHORS

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D. R. Fate is assistant superintendent, plants and pipelines, Abqaiq district, Arabian American Oil Co., Dhahran, Saudi Arabia. He is a chemical engineering graduate of University of Michigan and has been with Aramco since 1947, transferring to Arabia in 1948.

drawals was still being increased. This decrease in pressure decline rate develops from the ever-increasing compressibility of the saturated portion of the reservoir which itself grows with continuing decline in reservoir pressure.

Second, free gas develops in the reservoir until individual wells display increasing gas-oil ratios. This is an adverse effect as it causes reservoir space voidage for which no useful product is obtained. The first evidence of this development was noted in Abqaiq Well No. 50 located on the crest of the structure. Fig. 4 presents the trend in gas-oil ratio as a function of reservoir pressure observed for this well. The gas-oil ratio given herein is the ratio of gas liberated in the first stage of separation at about 500 psig. to the stock-tank oil produced. This comparison was used as it simplified observations and was found to be representative. The gas-oil ratio behavior of AW-50 forecast what might be expected of producing wells lower on the structure when their formation mid-point pressures declined to values similar to those noted for Well No. 50. One difference did exist between these lower structure wells and AW-50 and that was that gravity drainage would act to depress their increase in gas-oil ratio, whereas it acted to increase the gas-oil ratio of AW-50. On Fig. 4 is shown the calculated gas-oil ratio behavior to be expected of lower-structure wells if gravity drainage was fully effective. This is, of course, the ideal condition and it was not expected to be fully realized. Individual wells, dependent upon their structural location would display gas-oil ratio behaviors somewhere intermediary to the two limiting conditions. Subsequently, it has been found that wells located on the nose portions of the major closure where the dips are extremely low have developed increasing gas-oil ratios intermediary to the two trends shown on the chart. This development accounts for the 18 wells previously referenced as no longer being producible.

Early in 1951 the Ghawar field was placed on production and by 1952 was capable of relieving Abqaiq of the large production burden it was bearing. Fig. 2 again illustrates this development. The withdrawals from Abqaiq were reduced by mid-1952 to where they closely approximated the natural water influx. This was especially true for the southern portion of the field where the problem of free gas saturation was growing. This provided a breathing period for concluding plans relative to pressure maintenance operations.

Studies for Pressure Maintenance

Relatively brief studies proved the advisability of instigating pressure maintenance operations in Abqaiq. Field performance studies first employing the volumetric balance calculations and unsteady state principles expounded by Hurst and later supported by Bruce analyzer studies showed fairly conclusively that natural water influx would be inadequate for sustaining a high producing rate unless depletion practices were employed. Pressure maintenance operations were found to be superior from an economic standpoint in that they minimized well investment by sustaining high flowing rates, maximized income by maintaining the quality of crude produced through the use of stage separation at optimum conditions (this to a major extent reduces the requirement for a large expenditure in a gasoline recovery plant), and by maintaining flowing production offset the high lifting costs associated with artificial lift operations.

Having decided that pressure maintenance was desirable, it was then necessary to select the means. Gas injection was considered the most practical initial step. This was concluded from both the conservation standpoint and practical aspects of operation. Approximately 900 cu. ft. of solution gas per barrel of oil produced was being flared as there was then no economic commercial use for the gas. Natural gas is a commodity which at one time was wasted in the United States, but today has assumed great commercial importance. Possibly this may develop for Arabia someday, thus it was concluded that injection of as great a quantity of the flared gas as possible should be done as a conservation measure.

It was also considered that gas injection could be carried out more surely without adverse reservoir conditions developing than could water injections. Displacement calculations showed that attractive gravity drainage characteristics were prevalent and would result in low residual liquid saturations in the gas invaded zone. Thus, oil recovery to be expected from gas injection would at least be equal to that obtained by water invasion and would be greatly superior to that obtainable under depletion operations.

Capacity . . . Certain criteria had to be considered in the design of the injection plant. The capacity was fixed at 150 million standard cubic feet per-day. This volume was arrived at by determining the most probable long-term producing rate from the field under pressure-maintenance operations and calculating the volume of gas to be liberated daily in the first stage of separation. This first stage separator is operated at approximately 500 psig. and takes off nearly 60 per cent of the solution gas. Costs attendant to collecting and injecting lower-pressure gas were found to be too great to allow using this gas as well.

To forestall the loss of an excessive number of producing wells to production because of high gas-oil ratios, it was determined the mean reservoir pressure at the datum of 6,500 ft. subsea should be maintained at about 2,500 psig. This then dictated that the plant discharge pressure be no greater than 3,000 nor less than 2,600 psig. The suction for the first stage of compression was determined to be no less than 430 psig. This is a compression ratio of approximately 7, and would require about 20,000 compression horsepower.

Sampling at the separator plants of the gas to be injected showed it to be more than 50 per cent saturated with water. This necessitated the use of a dehydrator to minimize corrosion and forestall the formation of hydrates.

The gas, because of its solution origin, was wet in nature; thus, condensation of the heavier ends could be expected when the compressed gas was cooled between stages of compression. Equipment for removing the condensate was required.

Experience in Arabia has shown that centrifugal-type pumps give superior service over other types. It was concluded, therefore, that centrifugal compressors should be used wherever possible; however, it was stipulated that no untried design should be employed. It is extremely difficult to provide necessary service when the point of use is very remote to the manufacturer. In satisfying the above requirements it was found that centrifugal compressors with discharge pressure of 1,100 psig. had been in service for a reasonable period. Reciprocating units had always been used above this pressure. It was, then, decided that there would be two stages of centrifugal compression and one stage of reciprocating compression.

Gas-Injection Plant

To describe fully the gas-injection plant, we will start with the gathering lines from the three separator plants

and follow the gas as it progresses through the gas-injection plant.

The gas is collected from the three widely-spaced separator plants indicated on Fig. 1 by a 24-22-20-in. thin-wall fully restrained pipeline. The gas is delivered by this line to the first-stage scrubbers located at the compressor plant. This scrubber consists of a single vessel of the liquid-removal type, complete with mist extractor and is provided with a drain and shutdown alarm system.

Dehydration . . . The gas passes from the scrubber to the dehydration system which consists of two dehydrating columns arranged in parallel for alternate operation. Each column contains three parallel beds of beaded desiccant (Sovabead) suitably supported on a screen. One column is employed for dehydration while the other is being regenerated with hot gas. The wet gas enters the top of the beds on the dehydration cycle, where it is dried and emerges from the bottom of the beds to pass through a dust filter and into the first stage compressors.

Two dust filters are arranged in parallel and each is capable of normally handling 100,000 M.s.c.f.d. The dust filters are equipped with dropout pots to permit removal of the accumulated dust. The gas passes from the dust filters to the first-stage centrifugal compressors.

Compressors Arranged in Parallel

The first stage of compression consists of two Clark centrifugal compressors arranged in parallel to compress the gas from approximately 430 psig. to approximately 700 psig. Each compressor has a rated capacity of 90 million standard cubic feet per day and is driven by a Westinghouse steam turbine rated at 2,522 hp. at 9,000 r.p.m. and capable of delivering approximately 3,000 hp. at 10,400 r.p.m. The maximum capacity of each compressor under these latter conditions is approximately 105 million standard cubic feet per day.

The first-stage compressors discharge the gas to the first-stage discharge cooler. This cooler is an air-cooled, finned-tube exchanger which cools the gas to approximately 120° F. This requires three cells with four sections in each cell. The cooler is rated at a total of 20.9 million B.t.u. per hour. The gas passes from the cooler to the second-stage suction scrubber. Liquid hydrocarbons formed in the first-stage cooler are removed in this scrubber. This scrubber is identical to that for the first stage.

The gas leaves the scrubber and enters the second-stage compressors. These consist of two Clark centrifugals arranged in parallel which compress the gas from approximately 700 psig. to approximately 1,085 psig. These compressors are essentially identical to the first-stage compressors, except for a slight difference in the rotors. The drive for these units is identical with that employed on the first-stage compressors.

The gas passes from the second-stage compressors to the second-stage discharge cooler, which consists of an air-cooled, finned-tube exchanger composed of two cells with four exchanger sections in each cell, and one cell with three sections. The fourth section in the latter cell serves as the dehydration regeneration gas cooler. The gas flows from this second-stage cooler to the third-stage suction scrubber. This scrubber is identical to those already described.

Gas Compressed to 3,000 Psig.

The gas flows from this scrubber to the third-stage compressors. Here four Clark reciprocating compressors arranged in parallel compress the gas from approximately 1,085 psig. to approximately 3,000 psig. These compressors have a combined rated capacity of 168,400,000 s.c.f.d. Each compressor is driven by a 13,200-volt, 80 per cent leading power factor synchronous motor rated at 2,500 hp. and capable of delivering 3,000 hp. when operating near unity power factor. Clearance bottles are provided to permit load regulations of the machines. Fluor pulsation-damper systems are installed in the third stage suction and third stage discharge piping of the four reciprocating compressors to minimize vibration of piping and pulsation in meters. The gas is then distributed by the injection lines to wells AW-50 and AW-6.

"Here comes someone with Frisby now."

Dates of Construction Progress

Construction on the plant commenced by ground breaking early in 1951. The gas-collection line to the several separator plants was one of the first installations completed. The curtailed rate of production from the southern part of Abqaiq has limited the availability of power gas in the vicinity of GOSP 1, thus it was necessary that additional sources be tapped, and this was conveniently done by means of the collection line. For many and varied reasons the construction schedule was interrupted several times. This resulted in a year's delay in the final completion of the plant beyond the date originally planned. Finally, the plant was completed in March 1954.

Construction blinds isolating this plant from process lines already in operation were removed March 17, 1954. Gas was admitted to the plant and the air in the lines and vessels making up the plant was purged out through the injection lines and through temporary tailpipes installed at Wells Nos. 6 and 50. The "break-in" process for the Sovabeads in the dehydrators was undertaken and required 3 days. Many minor leaks were discovered, and several valves in the system were found to operate improperly. These were all corrected by March 24 and the initial "lighting-off" of the compressors was undertaken.

The plant has yet to be brought to its full capacity. It is expected this will be accomplished before the end of the year.

Remote Location Complicates Problems

The length of time from plant start-up to successful operation reflects the difficulties of carrying out remote operations. Many of the troubles encountered could have been corrected much more rapidly if the plant had been located in the United States.

Concurrent with the plant construction, the personnel who were to operate and supervise its operation were sent to visit various plants of similar design located in the United States. This was considered an essential training phase to indoctrinate these people into the problems to be encountered and to develop judgment in the handling of same. These personnel also spent the last 6 months during plant construction in the plant itself to become intimately acquainted with every detail of the equipment.

Now that the initial problems of plant operation have been overcome routine injection of approximately 150,000 M.s.c.f.d. is planned. This will allow sustained optimum withdrawals from the Abqaiq reservoir with only a minimum loss in reservoir pressure and permit most economic operation of the field.

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Detroit, 26 ..... 1514 Lafayette Bldg.
Houston, 2 ..... 2119 C & I Life Bldg.
Los Angeles, 17 ..... 1523 General Petroleum Bldg.
New York, 6 ..... 3347—165 Broadway Bldg.
Philadelphia, 3 ..... 1615—1700 Walnut Street Bldg.
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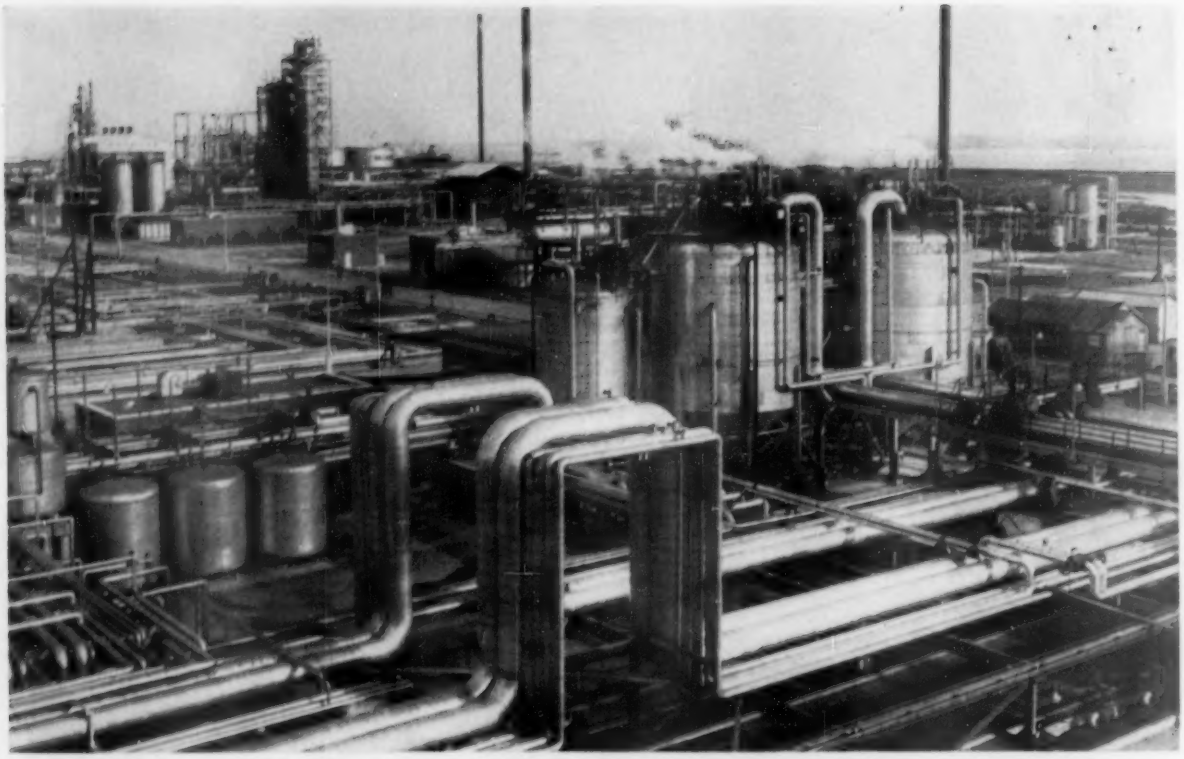


BRITAIN'S *newest refinery*, Vacuum Oil Co.'s Coryton plant, has a design capacity of a million tons of crude oil a year.

Let's take a look at . . .

Oil Supply and Demand in Europe

by John U. Tannhauser

- Consumption is soaring. It more than doubled from 1949 to 1953, and is expected to increase 7 per cent this year.
- But so is refining capacity. By January 1, Europe will have a crude throughput capacity of 2,400,000 bbl. daily.
- Today's result: oversupply. Domestic consumption is estimated now at 1,600,000 bbl. per day vs. a refined product supply of 2,200,000 bbl. per day.
- Tomorrow? It depends . . . on fuel policy, government controls, consumer demands. Europeans can use the supply—if they're allowed to.

DURING the current year refining capacity in Europe, and therefore potential supply of petroleum products, continues in excess of actual demand.

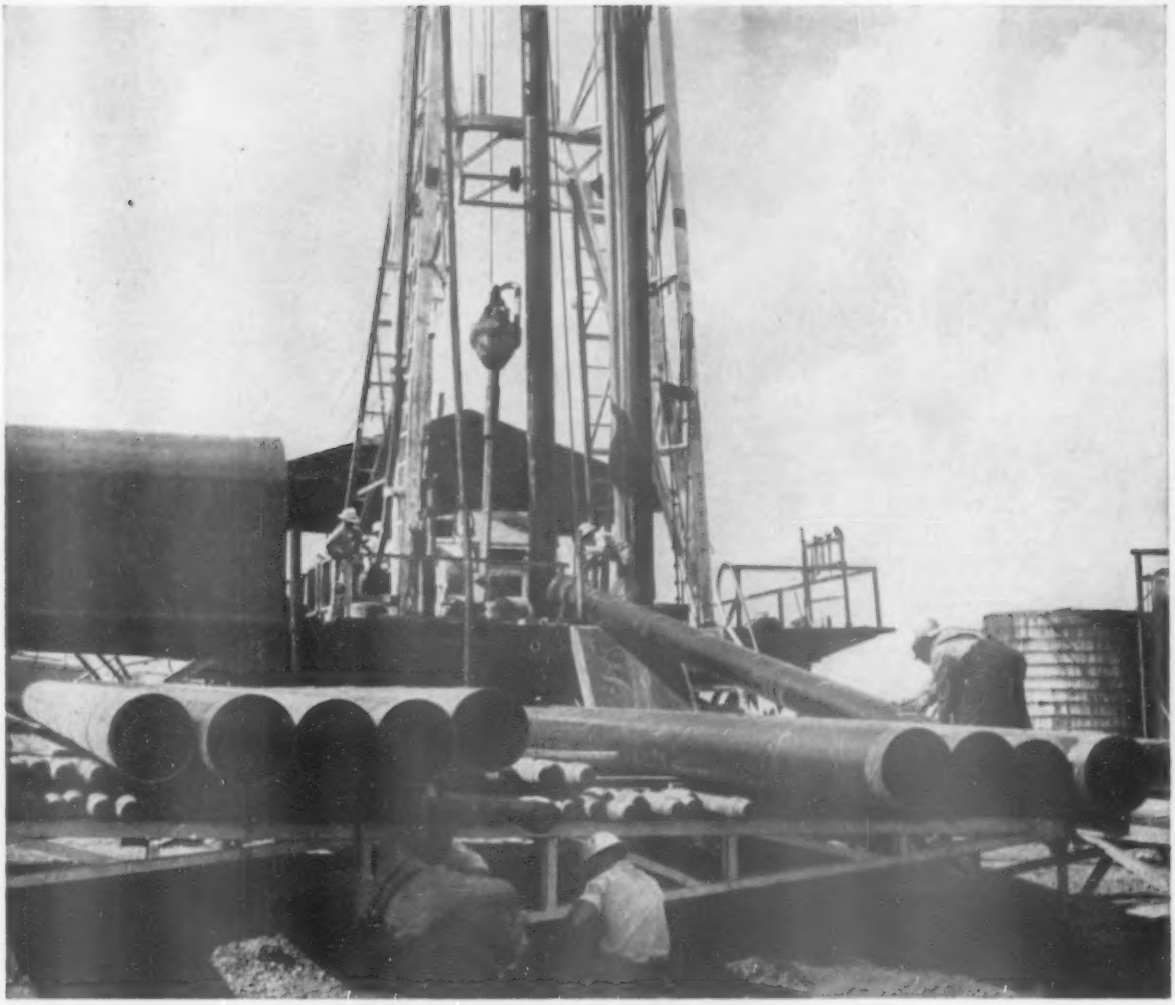
This unbalanced situation became apparent during 1952 but has recently been brought again into focus as additional refining capacity came on stream in the Middle East—at Aden and Abadan. The output from these Middle Eastern refineries now threatens to recapture present European export markets located in areas east of Suez and in those countries of the Eastern Mediterranean where little or no domestic refining industry exists to date. At the same time, strong pressure is being brought to bear upon the European oil industry to modernize existing facilities and to build additional refinery capacity in areas which currently depend on the importation of refined petroleum products.

Author is acting chief, Petroleum Branch, Industrial Specialists Division, Foreign Operations Administration, Washington.

The construction of expensive refineries has become increasingly a means to retain or acquire a national market, regardless of the initial cost of these facilities or whether they may duplicate similar, not fully utilized, plant capacity in the same general area. This rather gloomy immediate outlook for the European petroleum industry is, fortunately, brightened by the continued surge in demand for more energy and, hence, for more petroleum products.

Demand for Refined Products

During 1953, Europe consumed 1,500,000 bbl. daily of petroleum products for domestic use and international bunkers. This amount was equivalent to about 12 per cent of the total output of the world's crude oil during that year. The European level of consump-



Exact 40′ lengths of Armco casing save money

The uniform 40-foot lengths of Armco Slip-Joint Casing mean fewer sections to handle, fewer joints in the string. Square ends and mill-attached collars permit fast line-up without clamps. Work goes faster and you save money!

Further savings are possible with the wide choice of Armco Casing diameters (6″ to 24″) and uniform wall thicknesses ($\frac{3}{16}$″ to ½″). With this wide range it's unnecessary to specify more metal than you need.

Then, too, operators find they can safely set lighter strings to greater depths because of the uniformly high collapse resistance of Armco Casing.

Quick delivery is another important advantage. Armco Casing is distributed by National Tank Company who will handle your order promptly for direct mill shipment. They also maintain branches strategically located throughout the oil country.

Write us for complete data. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 4394 Curtis Street, Middletown, Ohio. 201 KOME Building, Tulsa, Oklahoma. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

ARMCO SLIP-JOINT CASING

DISTRIBUTED BY NATIONAL TANK COMPANY, TULSA, OKLAHOMA

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EASTERN STATES PETROLEUM CO., INC.
6936 MANCHESTER AVENUE
P. O. BOX 5008 - HARRISBURG STATION
HOUSTON 12, TEXAS

RICHARD B. KAHLE
PRESIDENT

HOUSTON PHONE
WENTWORTH 1651
CABLE ADDRESS
EASTAPET
HOUSTON, TEXAS

March 16, 1954

Mr. George R. Brown
Executive Vice President
Brown & Root, Inc.
P. O. Box 3
Houston 1, Texas

Dear Mr. Brown:

The rehabilitation of our alkylation unit and its conversion from hydrofluoric to sulfuric catalyst type was completed by your people last month and put into immediate operation. The work was finished in a hundred and one working days from the date you were given the contract.

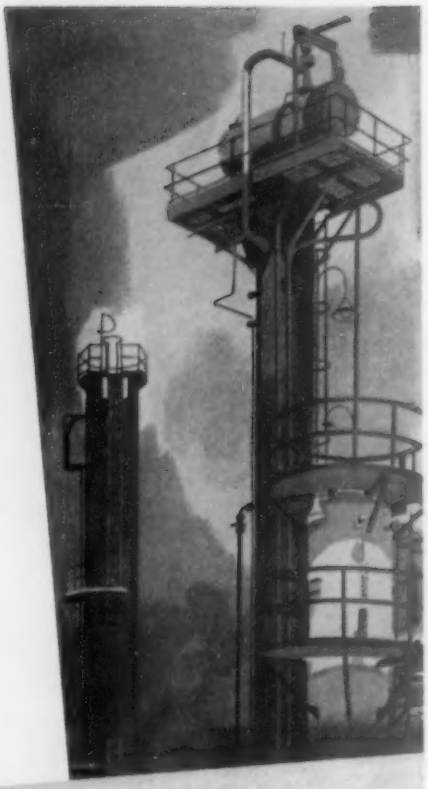
This work, I believe, sets a record in two cases: first, in time of completion; and, second, in the fact that the plant started up immediately on completion, was gradually brought up to capacity, is running at more than designed capacity, is running at full designed specifications and has required no substantial change of the equipment as completed.

As I told you shortly after this job began, it was of great importance for us to finish it promptly and have it in operation at full capacity immediately upon completion. You personally stated that you would do everything you could to expedite the completion and that it would be a good job. You have certainly complied in both instances.

I want to thank you personally, and for my associates in the company, on the job you did for us and I wish you would convey to your associates who worked on this construction, our grateful appreciation and thanks.

Sincerely yours,

R. B. Kahle

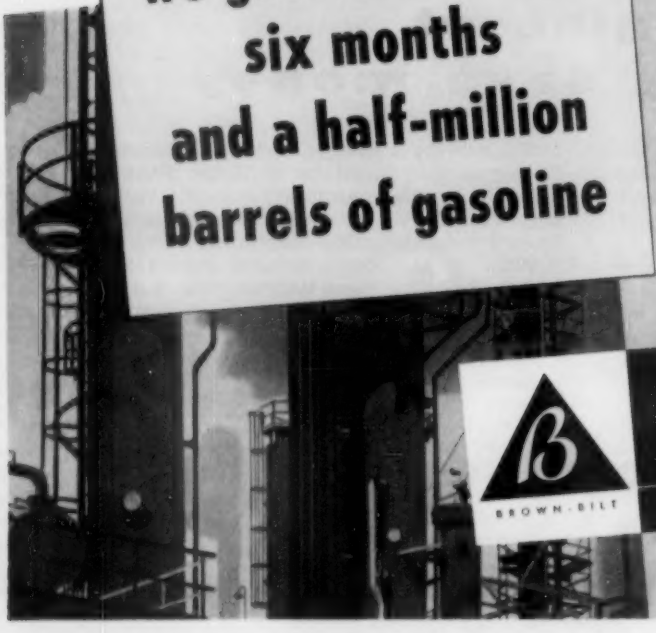


we gave them back six months and a half-million barrels of gasoline

The new Eastern States Petroleum Company's aviation gasoline refining unit chalked up another rapid completion for Brown & Root. The plant was finished in the record time of 101 working days . . . cutting more than six months off normal construction time.

Early completion of a project means a bonus of unexpected production which, in the final analysis, represents a gratifying reduction in plant cost.

If your organization plans construction, contact Brown & Root. Planning experts will be put at your disposal . . . no obligation, of course.



BROWN-BILT

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Engineers ▲ Constructors
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BROWN ROOT de MEXICO, S.A. de C.V., Mexico City, Mexico
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BROWN & ROOT, LTD., Edmonton, Alberta, Canada
BROWN & ROOT, S. A., Panama City, Panama

BRITAIN: a seismic crew drills a shot-hole well near Whitside, Yorkshire.

GERMANY: a portable rig operates at Hemmelbe oil field.

NETHERLANDS: Europe's first cat cracker unit on stream at Shell's Rotterdam refinery.

tion of petroleum products amounted, however, during 1953 to only one-fifth of the United States level.

This relatively low rate of European oil consumption is partly explained by the fact that coal still represents there the major source of fuel. In 1953 coal supplied three-quarters of the area's total energy requirements. Nevertheless, European consumption of petroleum products has experienced a significant increase since 1948.

Consumption nearly doubles . . . During this 5-year period, 1949-53, consumption rose from a level of 812,000 bbl. daily to 1,482,000 bbl. daily. This expansion in demand is equivalent to an average yearly growth of over 12 per cent, although the actual rate of increase during the past 2 years has been slightly below this average.

Actual total consumption rose by nearly 9 per cent between 1952 and 1953 and, according to the latest forward estimates by the Oil Committee of the Organization of European Economic Cooperation (OEEC) in Paris, a further increase of 7 per cent is anticipated this year. By contrast, domestic consumption in the United States increased by somewhat less than 5 per cent during 1953, and average daily demand during the first half year of 1954 was only about 0.6 per cent above the 1953 level. Average daily consumption during the second quarter, in fact, lagged behind the 1953 yearly average.

Headaches . . . Encouraging as the sustained rate of expansion of European petroleum demand may be, it has nevertheless brought its headaches to the European petroleum industry. European car owners share with their counterparts the world over the desire for better, higher-octane gasolines. As late as 1950, Europeans were still using

TABLE 1—ANALYSIS OF EUROPEAN INLAND CONSUMPTION TRENDS IN INDIVIDUAL PETROLEUM PRODUCTS
(Thousands of barrels daily)

	Motor gasoline	Kerosine (incl. jet fuel)	gas diesel*	Fuel oil*	Other‡	TOTAL
Prewar av.	240	42	52	112	76	522
1948-49	214	58	162	224	94	752
1953	340	64	292	408	†63b	1167
1954 (est.)	359	66	316	438	120	1299
		(Per cent of total)				
Prewar av.	46	8	10	21	15	100
1948-49	28	8	22	30	12	100
1953	29	6	25	35	5	100
1954 (est.)	28	5	24	34	9	100
		(Indexes: 1948-49=100)				
Prewar av.	112	72	32	50	81	69
1948-49	100	100	100	100	100	100
1953	159	110	180	182	67	155
1954 (est.)	168	114	195	196	128	173

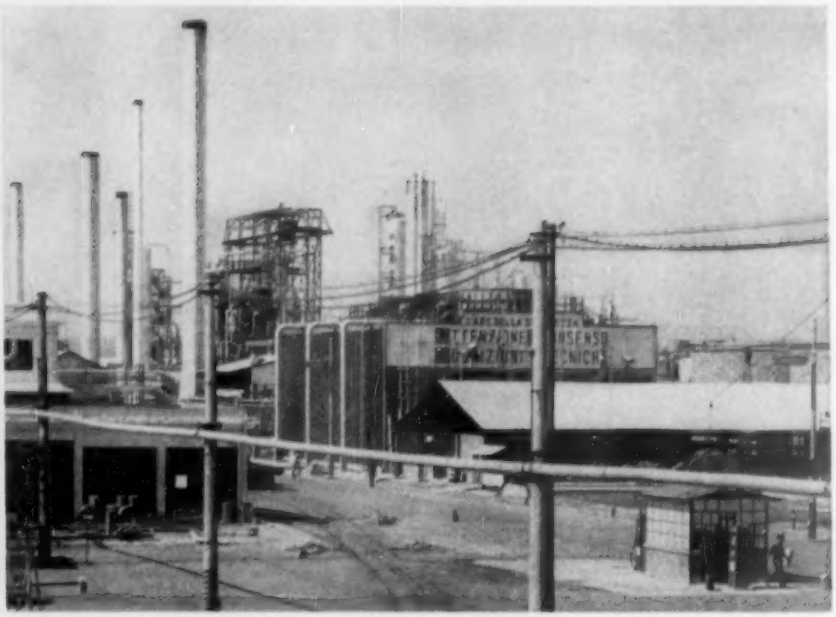
*Excluding international bunkers.
†This reduction is not explained in the OEEC statistics.
‡Figures in this column represent the difference between the total and the other columns.
Note—Uniform conversion rate of 7.3 bbl. per 1 metric ton was applied.
Source: OEEC statistics.

TABLE 2—SHARE OF INDIVIDUAL PETROLEUM PRODUCTS IN 1953 TOTAL PETROLEUM CONSUMPTION OF THE U. S. AND THE OEEC COUNTRIES
(Thousands of barrels)

	United States*		Europe†		Comparative demand distribution	
	Daily av.	Per cent	Daily av.	Per cent	Daily av.	Per cent
Motor gasoline	3376	45	340	23	900	44
Kerosine	331	4	64	4	64	3
Gas/Diesel oil	1345	18	348	24	348	17
Fuel oil	1539	20	550	37	550	27
Other	1008	13	180	12	180	9
TOTAL	7599	100	1482	100	2042	100

*From The Oil and Gas Journal, December 22, 1953, issue.
†OEEC Oil Committee figures. They include international bunkers.
Note: Tonnage figures used in the OEEC Statistics were converted at the rate of 7.3 bbl. per 1 metric ton.

BELGIUM: a new Houdriflow cat cracker at Albatros refinery, Antwerp.



ITALY: a partial view of Socony-Vacuum's Naples refinery. This operation has a distillation charging capacity of 60,000 bbl. per day and a thermal cracking charging capacity of 5,000 bbl.

a 70-octane brand. Today, the average is nearer 84-octane. In this octane race, gasoline taxation often has been found to act as a stimulant. In some countries where taxation for regular brands equals that for premium brands, the rate of taxation is so high that the purchase of better premium gasoline results in actual savings to the motorist.

The octane race is also reflected in the present boom in the construction of catalytic reforming units. Catalytic reforming capacity will increase more than sixfold in the 3-year period from 1953 to 1956, or from less than 9,000 bbl. a day in 1953 to an estimated 57,000 bbl. a day in 1956.

However, European gasoline taxation has affected more directly the expansion of demand for diesel oil as is shown in Tables 1 and 2.

Table 1 illustrates the changes which have occurred in Europe's petroleum consumption since prewar. Industrial fuels, i.e. distillates and fuel oil jointly, rpresented in pre-war only about one-third of the total inland consumption but moved up to a position of two-thirds of the total in 1953.

Half U. S. ratio . . . According to Table 2, gasoline's percentage of total oil use in Europe is only about half the ratio in the United States. Thus, in Europe the share of motor gasoline in total consumption of petroleum products amounts to only 23 per cent against 45 per cent in the United States. On the other hand, European diesel-oil consumption is 1½ times as important as in the United States. Fuel oil is nearly twice as important as in the United States.

The significance of this "gasoline deficit consumption" can be brought to light more clearly by arbitrarily raising gasoline's share in the 1953 consumption to 43 per cent or about 900,000 bbl. It will be found that under these

TABLE 3—EUROPEAN REFINERY OPERATIONS IN 1953 AND 1954
(Thousands of barrels daily)

	1953	1954	Change
1. Rated refinery throughout capacity	2199	2379	+180
2. Actual and expected rate of operation			
(a) Throughput	1638	1827	+189
(b) Output	1543	1684	+141
(c) Per cent plant utilization	75%	77%	+2%
3. Actual and expected demand			
(a) Domestic demand and bunkers	1482	1586	+104
(b) Apparent export demand	61	98	+37

Note: Tonnage figures used in OEEC Statistics were converted at the rate of 7.3 barrels per 1 metric ton.
Source: OEEC Statistics.

TABLE 4—ESTIMATED CONSUMPTION OF COMMERCIAL SOURCES OF ENERGY IN THE UNITED STATES AND SELECTED OEEC COUNTRIES
(In bituminous coal equivalents)

	Total millions of tons					Per capita tons)				
	1929	1937	1949	1952	1953	1929	1937	1949	1952	1953
United States	803	759	1032	1230	(n.a.)	6.57	5.89	6.92	7.84	(n.a.)
All OEEC countries	608	629	573	680	678	2.32	2.28	2.12	2.45	2.43
Belgium-Lux	38	35	31	34	33	4.53	4.02	3.45	3.78	3.65
France*	102	88	88	99	94	2.42	2.12	2.11	2.32	2.18
Germany†	189	205	115	152	148	2.94	3.02	2.35	3.14	3.02
Greece	1	1	1	2	(n.a.)	.14	.18	.19	.27	(n.a.)
Italy	25	28	27	38	40	.61	.66	.58	.82	.85
Norway	10	10	13	16	16	3.71	3.44	3.97	4.81	4.91
Turkey	1	2	5	6	(n.a.)	.09	.13	.27	.28	(n.a.)
United Kingdom	188	202	217	236	241	4.11	4.28	4.30	4.66	4.74

*Consumption in the Saar included in the French figures for 1929; in the German figures for 1937.
†Prewar German figure included consumption in East Germany and areas now ceded to Poland.
Source: OEEC Statistical Bulletins Aug.-Sept. 1954.

circumstances the European and United States consumption patterns would be very similar indeed. Column 3 of Table 2 shows this pattern.

The European refiner obtains his present refinery margin largely because of the availability of lower cost Middle East crude oil. Nevertheless, the European refiner has his share of technical and pricing problems.

Technical problems . . . The more important technical problems arose because U. S. technology has concentrated on improving the output and quality of motor gasoline. Although the catalytic cracking process serves primarily this purpose, the European petroleum industry, in an effort to make its refinery operations more flexible, has found it expedient to expand its catalytic cracking capacity from almost zero in 1948 to 263,000 bbl. daily in 1954. Through further additions to its cracking capacity, Europe will arrive by 1956 at an estimated capacity of 408,000 bbl. daily. As a result, gasoline is now in ample supply.

In coming years, undoubtedly, a portion of the increasing output of light products will serve as a raw material for Europe's growing petrochemical industry. The future supply position of light products will, however, depend extensively on what the level and policies of petroleum taxation will be in the various countries in Europe. As a result of current tax levels in some European countries even a 50 per cent reduction in the refinery price of the gasoline would lower the cost of the product to the consumer by not more than about 13 per cent.

Will need relief . . . Under the circumstances, the European oil industry may be compelled eventually to seek relief through higher distillate prices. The increase would check the further expansion of the demand for this product and at the same time create incentive for the development and utilization of refining techniques designed to enlarge the volume and increase the quality of the middle distillates output. Expressed differently, the industry may be compelled to shift the impact of the gasoline taxes over onto the middle distillates. In this change, the European consumer would stand to lose. He would be deprived of a low-cost fuel which the rich Middle Eastern oil fields promise him. High fuel cost would be detrimental to the further economic development of Europe.

The Supply Position of Crude Oil and Refined Products

To start with a happy thought: The Europeans are fortunate to be within the supply area of the Middle East where at the present time no signs of shortage exist in either crude oil or refined products. This means plenty of potential low-cost energy over a long period of time.

Europe lacks crude . . . Europe itself lacks crude oil resources and depends on outside supplies for more than 90 per cent of its oil needs. Nevertheless, some European countries have made significant strides in the development of their crude-petroleum resources. Earlier this year the important Parentis field was discovered in France. The field's initial wells are reported producing at a daily rate of over 4,000 bbl. each. Eventually France (similar to Germany and Holland today) promises to be able to rely on its own fields for the supply of a substantial amount of its crude-oil needs. It is too early, however, to predict the exact magnitude of Parentis field at this time.

Another important "competitor" to the Middle East crude-oil supplier will be Middle East natural gas which is currently being flared in large volumes. Recently methods have been perfected to transport this gas in tankers at atmospheric pressure over long distances. This method of transportation may soon replace an earlier, somewhat less realistic, project which proposed to carry Middle East gas to Europe by long-distance pipelines. Europeans have already shown great interest in the possibility of shipping natural gas by tankers.

Refined products position . . . Europe's supply position in refined products is far more complex since Europe today is a large-scale refining area. On December 31, 1953, Europe's refineries were capable of handling nearly 2.2 million barrels of crude oil a day with a potential output of 2.1 million barrels of refined products. By the end of this year the crude throughput capacity will go up to about 2,400,000 bbl. daily, which is equivalent to about 2,200,000 bbl. daily of refined products. By contrast, domestic consumption (including bunker trade) amounted in 1953 to 1,500,000 bbl. daily. The level is likely to rise by about 100,000 bbl. to 1,600,000 bbl. daily in 1954. A gap exists therefore between actual European demand and potential refining capacity, amounting to about 600,000 bbl. daily both in 1953 and during the current year. Although no recent statistics are available on how much of this difference actually constitutes exports to areas outside Europe, OEEC estimates that refineries will be operated at 75 per cent of their capacity in 1953, and at 77 per cent of their capacity in 1954. Table 3 summarizes the position and operation of European refining industry in 1953 and 1954.

The greatest concentration of Europe's surplus refining capacity is located in the Mediterranean area. By the end of this year Italy alone is expected to have 311,000 bbl. of daily capacity over and above its internal domestic needs. This total amounts to about one-half of the total European gap between inland consumption on the one hand, and available refining capacity on the other.

Until recently much of the Italian "excess" capacity was used to supply a growing export market ranging from areas east of Suez to West Africa and to Scandinavia. However, with the return of the Abadan refinery and the opening of the Aden refinery, Italian exporters are now face to face with serious competition. Moreover, many of Italy's present markets are currently seeking to establish their own domestic refinery industry. In many places such a refinery industry is now either in the blueprint stage or under actual construction. Although price wars are not uncommon in Italy, they have in general been confined to the internal Italian market.

The consequences of the present surplus refining capacity is difficult to predict as long as European refining capacity continues to expand at the present rate. According to OEEC's cautious forward estimates, European demand for all petroleum products will increase between 1953 and 1956 by 254,000 bbl. daily, whereas additions to existing refining capacity will amount to 268,000 bbl. daily during the same period, not counting the construction of a proposed 30,000 bbl. daily refinery in Greece.

Future Relationship Between Supply and Demand

What is in store for the European petroleum industry? No doubt Europe has many oil problems, both on the demand and the supply side. The availability of ample supply of Middle East oil at low cost as well as Europe's continued large potential demand for more energy is good news to the continent's oil industry.

Europe's per capita consumption—which is lower than that in the United States even in the more industrialized European countries (as shown in Table 4)—promises ample room for the expansion of energy demand.

By how much the demand for energy and for petroleum will increase depends largely on the attitude of the various European countries toward questions such as fuel policies, government control over the fuel industries, and European economic cooperation.

It is generally recognized that the use of increased quantities of mechanical power in lieu of animal and human

brawn represents a fundamental characteristic of our modern civilization, of the improved dignity of man, and of better living standards. Increased consumption of energy, including petroleum, is therefore important to economic progress.

On the other hand, it is generally overlooked that expansion in the total energy consumption usually benefits all major industrial fields although, as a rule, not in equal proportions. Neither oil, nor coal, nor hydroelectric power lacks the potentiality of relative easy conversion into usable efficient energy. It follows that Europe as well as its various energy industries only stand to gain as energy consumption increases there.

Government policies such as those which would impede greater energy consumption or which would force the construction of uneconomic refining capacity eventually will raise the domestic cost of energy and thereby will tend to retard the consumption of all types of fuel. This effect upon price levels will result even if the restrictive policies were applied to a few of the petroleum products only since all products are produced in a joint refining operation.

Effect of nationalization . . . By the same token, government operation of the petroleum industry has been found to restrain the development of demand for energy though, no doubt, examples exist where self-satisfied, lifeless industrial monopolies were temporarily revived through the shock of nationalization. Normally, however, government entities cannot safely assume the risks inherent in the petroleum industry nor can their planners anticipate and prepare in their budgets for the multiplicity of possibilities that will develop during periods of economic expansion. Equally important, government operation tends to be oriented eventually toward self-sufficiency and nationalism.

A trend toward both self-sufficiency and excessive nationalism would seriously hamper the development of the demand for energy. On the other hand, if the European countries should continue to move toward greater economic cooperation, untold possibilities would open to expand the use of energy and to raise European standards of living. Under these conditions, it would become increasingly difficult to continue the coexistence on the same continent of areas with very high standards of living and areas with very low. The process of lifting these standards would require large amounts of additional energy both in the exporting and the importing areas.

The future of Europe's demand for petroleum products will depend largely on final answers to these questions of fuel policy, government controls, and economic cooperation. These decisions, in turn, will determine the magnitude of the current European oil supply and demand problems. At best, the road is not simple and a great deal of understanding "give and take" between the various countries and the petroleum industry is needed.

Budgetary problems . . . It is no secret that many European countries still have budgetary and balance-of-payment problems. Many countries have found that large amounts of foreign exchange may be saved by importing crude oil instead of refined products. It has become apparent, however, that new refineries, built in areas where surplus capacity exists, are often a mixed blessing which threatens to raise the cost of energy to the consumer. The construction of complex refineries is an expensive means to gain or hold on to a market.

It is likewise clear that treasuries have the problem of balancing national budgets. Petroleum taxation has become an important source of revenue in many countries. It will remain a difficult task, however, to determine when a tax ceases to be primarily revenue bearing and begins to restrict fuel consumption.

The European petroleum industry (particularly affiliates of American oil companies) has done a fine job in its drive toward reducing the net foreign exchange cost of petroleum to the European countries by increasing its local purchases of materials and supplies needed in European and off-shore operations. It has been said, however, that present industry policies may have acted as stimulants to the drive for increased refining capacity. If true, the situation would call for a great deal of attention.

OEEC Oil Committee

The Oil Committee of the OEEC in Paris has done a great amount of pioneering in solving Europe's petroleum problems. This committee is now preparing a factual study on current European oil taxation and tariffs. The committee is also currently collecting facts about the status and laws of European crude-oil and natural-gas prospecting and production.

Role of U.S. Defense Support Programs

Meanwhile, the U. S. Defense Support Programs carried out by the Foreign Operations Administration are fading out of existence. Of the former participating countries, only Berlin, Greece, and Turkey are still now program participants, though in decreasing amounts. The newer Spanish and Yugoslav programs are implemented on a scale far below the amounts of some of the big Marshall aid programs. The Foreign Operations Administration may finance during the current fiscal year some military oil shipments going to these destinations. The Foreign Operations Administration will, of course, continue to take an active interest in the work of the OEEC Oil Committee, the OEEC as such, the European Payments Union, and the European Productivity Agency which carries on a European technical cooperation program.

Representative Prices of Foreign Crude Oil

ANGLO-IRANIAN OIL CO., LTD.

Crude-oil posted prices, effective October 29, 1954. For sales f.o.b. loading port in full cargo lots.

Loading port and grade of crude—	Price
Mina-al-Ahmadi:	
Kuwait, 31-31.9	$1.72
Fao:	
Iraq Persian Gulf	1.92
Tripoli:	
Iraq Mediterranean	2.39
Umm Said:	
Qatar, 40-40.9	2.08

SOCONY-VACUUM OVERSEAS SUPPLY CO.

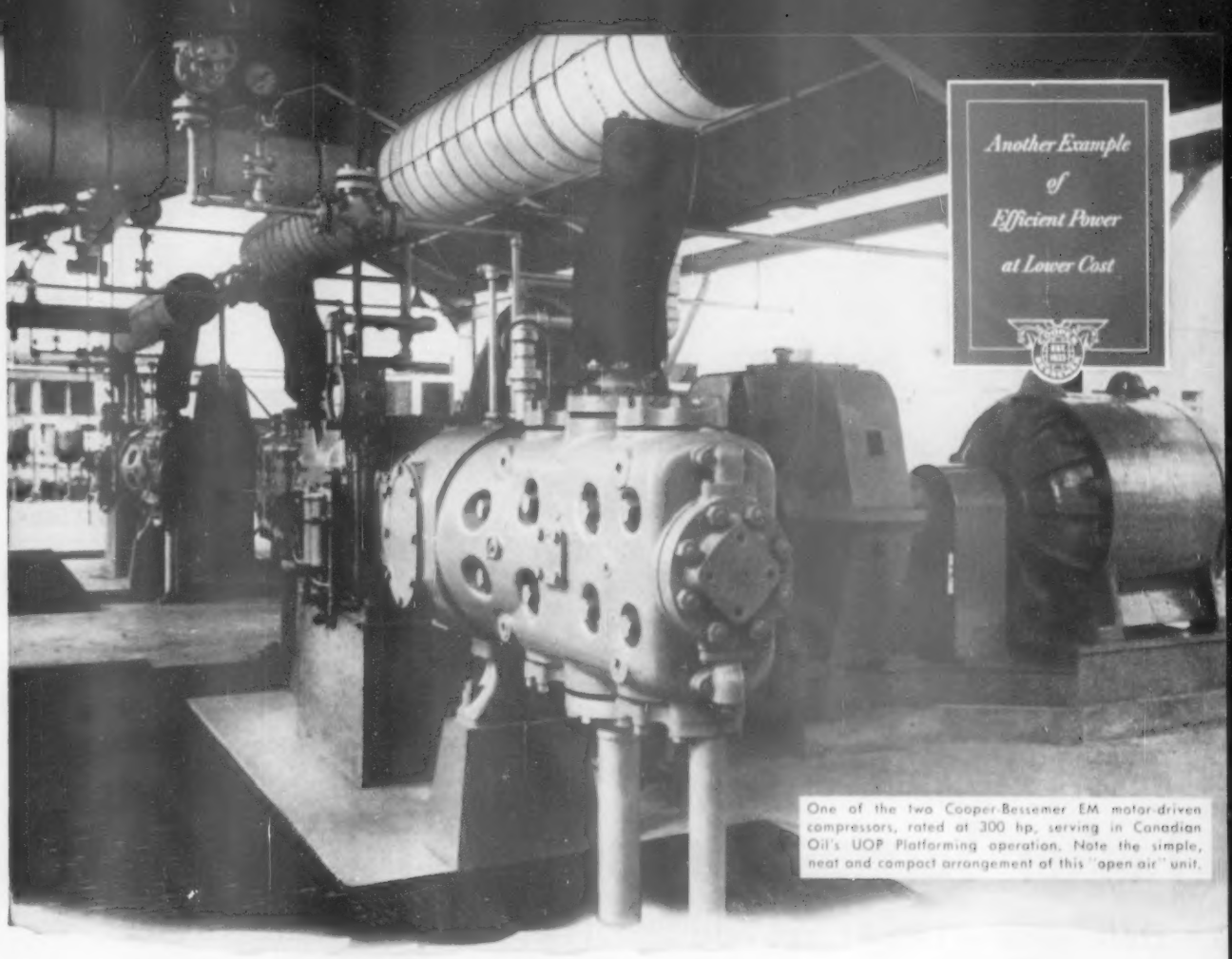
Posted export prices, effective November 3, 1954. For sale in cargo lots.

Loading port and grade of crude—	Price
Ras Tanura:	
Arabian, 36-36.9	$1.97
Sidon:	
Arabian, 36-36.9	2.39
Fao:	
Iraq, 36-36.9	1.92
Tripoli:	
Iraq, 36-36.9	2.39
Umm Said:	
Qatar, 39-39.9	2.06

CREOLE PETROLEUM CORP.

Crude-oil price bulletin No. 6. Cargo lots at Venezuelan ports.

Loading port and grade of crude—	Price
Amuay Bay:	
Bachaquero, 14-14.9	$1.76
Tia Juana, 19-19.9	2.13
Lagunillas, heavy	1.85
Tia Juana, 26-26.9	2.30
Tia Juana, 30-30.9	2.53
Mara, 30-30.9	2.58
Puerto La Cruz:	
San Joaquin, 42-42.9	3.06
Oficina, 32-32.9	2.82
Jusepin, 32-32.9	2.82
Caripito:	
Quiriquire, 18-18.9	2.25
Pedernales:	
Pedernales, 20-20.9	1.61



One of the two Cooper-Bessemer EM motor-driven compressors, rated at 300 hp, serving in Canadian Oil's UOP Platforming operation. Note the simple, neat and compact arrangement of this "open air" unit.

With CANADIAN OIL'S PLATFORMING UNIT... *a new high in compressor efficiency for high octane gasoline*

COOPER-BESSEMER 2-cylinder motor-driven M-Line compressors efficiently recycle hydrogen for the UOP Platforming unit in the Sarnia, Ontario, refinery of Canadian Oil Refineries, Ltd.

Cooper-Bessemer developed compressors with non-lubricated cylinders have permitted Canadian Oil Refineries to run its Platforming unit thousands of hours without any possibility of contaminating the recycle gas with lubricating oil.

Canadian Oil's Platformer is charging nearly 3800 barrels per stream day, and producing high yields of gasoline with an octane number reaching well into the 90's. In this process, Cooper-Bessemer EM's continue to play a vital and dependable role in the production of high octane gasoline.

If you are considering UOP Platforming, or compressor additions of virtually any type, Cooper-Bessemer offers more than a century of reliable compressor building experience. Contact our nearest office for detailed information.

MOUNT VERNON, OHIO

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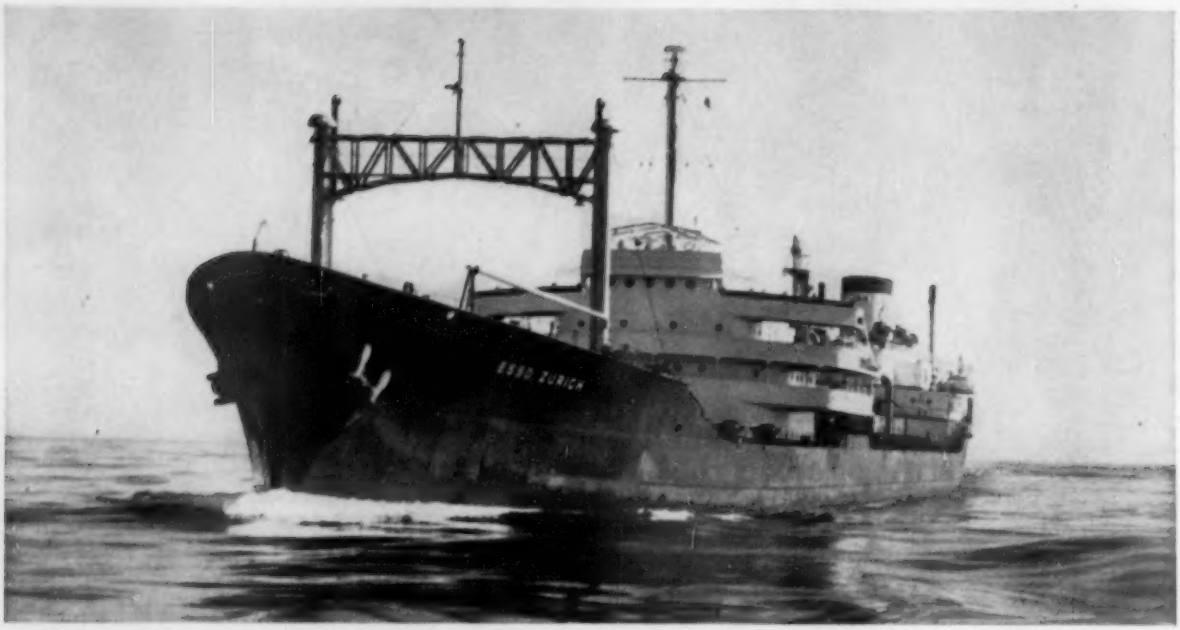

SUPERTANKERS like the Esso Zurich predominate among tankers currently under construction. World shipyards delivered 154 tankers in the first 9 months of 1954.

Tanker Surplus Continues to Increase

Deliveries in 1954 force additional tieup over December 1953

by John J. Winterbottom

SURPLUS tanker tonnage increased in 1954. Delivery of tankers continued at a pace that left a surplus at the end of the year equivalent to 263 T-2 tankers compared with vessels equivalent to 86 T-2's in tieup on December 31, 1953. (The T-2 tanker is a 16,600-d.w.-ton, 14.5-knot vessel.)

Tonnage presently under construction or on order as of October 1, 1954, with actual deliveries of tonnage during the years 1952 and 1953 and the first 9 months of 1954 is shown in Table 3. Records indicate that, while there have been construction contracts placed for tankers during the past 18 months, there have been almost an equivalent number of cancellations which has resulted in a decrease of the number of vessels under construction or on order each month since April 1, 1953.

Total deliveries of tankers (6,000 d.w. tons and over) amounted to 3,207,193 d.w. tons in the first 9 months of 1954. The summary of deliveries since 1947, shown in Table 5, is broken down between United States and foreign shipyards. The figures indicate the increases in tanker deliveries over the past several years as well as the increases in average size of vessels delivered.

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Additional tieup . . . The 1954 deliveries to date have resulted in additional tieup over December 1953, particularly of the smaller uneconomical foreign units as well as tonnage operating under the United States flag. The increased tieup is related to the spot voyage freight rate conditions that existed during the first 8 months of 1954 which ranged from a high of USMC minus 27½ per cent in February to a low of USMC minus 65 per cent in July. This tieup reached a total of 270 vessels equivalent to 196 T-2's in August 1954. However, the increased seasonal demand commencing in September resulted in freight rates improving to between USMC minus 30 per cent to minus 40 per cent in the various world trades. At the higher rate levels certain vessels were induced to come out of tieup thereby maintaining a depressing effect on the market. As of October 29, 1954, the tied-up fleet amounted to 189 vessels equivalent to 127 T-2's.

The spot-market rate averaged about USMC minus 45 per cent for the first 9 months of 1954 and, while certain spot situations may develop such as in September and October of this year, no sustained strength can be expected while a large tieup fleet is available which can be called upon as petroleum demand increases.

Tonnage Outlook

The tanker-transportation review

TABLE 1—ESTIMATED TANKER REQUIREMENTS AND TONNAGE—WORLD-WIDE INDUSTRY—EQUIVALENT T-2 TANKERS

	1953	1954	1955	1956	1957	1958
Available year-end tonnage (reflecting new construction and obsolescence)	1,758	2,010	2,194	2,349	2,469	2,469
Peak requirements	1,672	1,747	1,807	1,886	1,988	2,096
Surplus	*86	263	387	463	481	373
Per cent coverage	105	115	121	125	124	118

*Actual December 1953.

TABLE 2—TONNAGE AVAILABILITY ESTIMATE

	T-2 equivalents
Commercial tanker capacity of 6,000 d.w. tons and over as of December 1953	1,758
New construction delivered late 1953 which did not enter service until 1954	20
Total as of 12-31-53	1,778
Estimated 1954 new construction	272
Estimated 1954 scrappage	(40)
Total as of end 1954	2,010
Estimated 1955 new construction	244
Estimated 1955 scrappage and transfer of 20 T-2 equivalent commercial tonnage to government reserve status	*(60)
Total as of end 1955	2,194
Estimated 1956 new construction	190
Estimated 1956 scrappage	(35)
Total as of end 1956	2,349
Estimated 1957 new construction	155
Estimated 1957 scrappage	(35)
Total as of end 1957	2,469
Estimated 1958 new construction	50
Estimated 1958 scrappage	(50)
Total as of end 1958	2,469

*Construction of replacement tonnage by industry is included in United States construction figures to the extent of 5 T-2 equivalents in 1956 and 15 in 1957.

which has been published in the International Number of The Oil and Gas Journal since 1952 has indicated tanker surpluses of considerable magnitude for the next few years. The current review is no exception. Table 1 shows increasing surpluses from the 86 7-2's as of end 1953 to 481 T-2's as of end 1957 and decreasing to 373 T-2's at end 1958. These surpluses vary from 5 per cent of tonnage needs in 1953 to 25 per cent in 1956 and reducing to 18 per cent in 1958. This trend reflects an increase in available tonnage over the period of 711 T-2's or 40.4 per cent, compared with a gain in peak requirements of only 424 T-2's or 25.4 per cent.

Basis of tonnage . . . The available year-end tonnage is based on the estimated actual capacity of the world's shipyards during each year less an arbitrary allowance for obsolescence as shown in Table 2. It is interesting to note that if all vessels of 25 years of

TABLE 4—WORLD TANKER TONNAGE BY AGES AS OF OCTOBER 1, 1954

	United States flag		Foreign flag		Total	
Year built	No.	D.w. tons	No.	D.w. tons	No.	D.w. tons
1954	12	281,734	142	2,933,035	154	3,214,769
1953	15	359,955	172	3,416,979	187	3,776,934
1952	4	88,676	141	2,619,757	145	2,708,433
1951	2	60,310	125	2,128,948	127	2,189,258
1950	4	110,505	122	2,092,607	126	2,203,112
1949	3	80,102	98	1,737,098	101	1,817,200
1948	1	18,151	48	686,417	49	704,568
1947	1	12,853	30	417,362	31	430,215
1946	4	66,581	39	456,282	43	522,863
1945	71	1,203,567	122	1,908,341	193	3,111,908
1944	94	1,559,874	123	1,933,329	217	3,493,203
1943	106	1,672,601	97	1,369,347	203	3,041,948
1942	34	546,879	37	510,841	71	1,057,720
1941	14	207,535	22	301,141	36	508,676
1940	7	101,899	15	225,223	22	327,122
1939	3	48,695	46	614,258	49	662,953
1934-38	27	359,819	128	1,639,444	155	1,999,263
1929-33	7	95,181	111	1,390,243	118	1,485,424
1919-28	7	82,232	108	1,148,014	115	1,230,246
Prior to 1919	3	20,880	32	312,340	35	333,220
Total	419	6,978,029	1,758	27,841,006	2,177	34,819,035
T-2 equivalent	421.2		1,568.5		1,989.7	

TABLE 3—TANKERS REPORTED UNDER CONSTRUCTION OR ON ORDER OCTOBER 1, 1954

				Contract delivery dates—T-2 equivalent			
Yards—	No.	D.w. tons	T-2 equivalent	1954	1955	1956	After 1956
United States	9	263,250	18.4	14.6	3.8		
British	166	3,609,325	229.4	44.3	86.8	51.5	46.8
Swedish	80	1,713,200	108.9	24.5	39.7	29.9	14.8
Norwegian	34	665,700	42.3	3.2	12.5	9.5	17.1
Danish	8	178,850	11.3	1.1	5.7	4.5	
French	24	676,833	43.0	9.8	25.4	7.8	
Spanish	7	117,400	7.5	4.4	2.4		0.7
Netherlands	56	1,233,650	78.4	15.2	23.5	29.8	9.9
Italian	7	159,100	10.1	5.5	3.4		1.2
Belgian	11	205,900	13.1	3.9	5.3	1.2	2.7
Japanese	12	375,050	23.8	0.3	10.7	2.9	9.9
German	37	859,950	54.6	25.0	22.7	6.9	
Total	451	10,058,208	640.8	151.8	241.9	144.0	103.1

ACTUAL TANKER DELIVERIES

	Jan.-Sept. 1954			1953			1952		
	No.	D.w. tons	T-2 equiv.	No.	D.w. tons	T-2 equiv.	No.	D.w. tons	T-2 equiv.
United States yards	20	549,215	36.9	22	547,890	36.7	8	202,300	13.1
Foreign yards	134	2,657,978	167.4	166	3,211,200	197.4	139	2,508,796	150.5
Total	154	3,207,193	204.3	188	3,759,090	234.1	147	2,711,096	163.6

TABLE 5—TONNAGE DELIVERED BY WORLD SHIPYARDS—YEAR 1947 TO DATE
(6,000 d.w. tons and over)

	United States yards			Foreign yards			Total		
Year	No. of vessels	D.w. tons	T-2 equiv.	No. of vessels	D.w. tons	T-2 equiv.	No. of vessels	D.w. tons	T-2 equiv.
1947	1	27,500	1.8	30	399,788	21.9	31	427,288	23.7
1948	4	78,800	5.2	47	643,890	35.4	51	722,690	40.6
1949	33	847,500	56.2	63	869,560	47.3	96	1,717,060	103.5
1950	23	600,450	38.2	103	1,561,216	88.6	126	2,161,666	126.8
1951	4	120,000	8.0	126	2,086,615	121.3	130	2,206,615	129.3
1952	8	202,300	13.1	139	2,508,796	150.5	147	2,711,096	163.6
1953	22	547,890	36.7	166	3,211,200	197.4	188	3,759,090	234.1
First 9 months 1954	20	549,215	36.9	134	2,657,978	167.4	154	3,207,193	204.3

TABLE 6a—WORLD TANKER TONNAGE AS OF OCTOBER 1, 1954
(Excluding Military and U.S.S.R.)
(6,000 d.w. tons and over)

D.w. tons category—	United States flags			Foreign flags			Total		
	No. of vessels	D.w. tons	T-2 equiv.	No. of vessels	D.w. tons	T-2 equiv.	No. of vessels	D.w. tons	T-2 equiv.
6,000-15,999 d.w. tons	88	1,085,866	56.3	890	10,873,691	534.3	978	11,959,557	590.6
16,000-19,999 d.w. tons	298	5,010,233	305.7	632	10,828,208	644.7	930	15,838,441	950.4
20,000-23,999 d.w. tons	3	61,161	3.2	73	1,506,905	91.9	76	1,568,066	95.1
24,000 d.w. tons and over	30	820,769	56.0	163	4,632,202	297.6	193	5,452,971	353.6
Grand total	419	6,978,029	421.2	1,758	27,841,006	1,568.5	2,177	34,819,035	1,989.7

TABLE 6b—BREAKDOWN OF PRESENT CONSTRUCTION CONTRACTS AS OF OCTOBER 1, 1954
(Excluding Military and U.S.S.R.)
(6,000 d.w. tons and over)

D.w. tons category—	United States flags			Foreign flags			Total		
	No. of vessels	D.w. tons	T-2 equiv.	No. of vessels	D.w. tons	T-2 equiv.	No. of vessels	D.w. tons	T-2 equiv.
6,000-15,999 d.w. tons				34	429,850	27.3	34	429,850	27.3
16,000-19,999 d.w. tons	1	16,000	1.1	213	3,803,250	241.7	214	3,819,250	242.8
20,000-23,999 d.w. tons				31	649,100	41.2	31	649,100	41.2
24,000 d.w. tons and over	4	111,950	7.8	163	4,959,508	316.1	167	5,071,458	323.9
Grand total	5	127,950	8.9	441	9,841,708	626.3	446	9,969,658	635.2

age and over were scrapped, the indicated surplus as of end 1958 coincides with the surplus shown in Table 1 which is based on the arbitrary allowance as indicated above. But, if all vessels were scrapped as they reach 20 years of age, the net result would be further scrapping of about 62 T-2 equivalents as of end 1958, leaving a surplus of 311 T-2 equivalents amounting to about 15 per cent of estimated transportation needs.

There is one factor which may well bring a change in the tanker situation shown statistically in Table 1. All T-2-type and other war-built tankers totaling 665 T-2 equivalents will become due for their third 4-year survey in the period 1955-1957 and many of them will require major reconditioning to be maintained in class. These expenditures may not be undertaken unless demand for tanker transportation increases substantially beyond the requirements shown in Table 1.

Last-quarter additions . . . The tonnage in tieup, according to records, was equivalent to 127 T-2's as of October 29, 1954. It is estimated that 68 T-2 equivalents of new construction will be delivered in the last quarter of this year. When this new tonnage is added to the 127 T-2's presently in tieup, the total of 195 T-2's is somewhat short of the 263 T-2's estimated surplus as of the end of 1954 shown in Table 1, but is still a sizable surplus.

Table 6a shows a breakdown of the world fleet as of October 1, 1954, by United States and foreign flags in various deadweight-ton categories. Note that on an equivalent T-2 basis only 448.7 T-2's or 22.5 per cent of the world fleet is in vessels of 20,000 d.w. tons and over.

From the tonnage under construction for commercial account as shown in Table 6b, it will be seen that 365.1 T-2 equivalent are in vessels of 20,000 d.w. tons and over. This amounts to 57.5 per cent of construction contracts as of October 1, 1954. When this new tonnage is delivered by, say, the end of 1957 and added to the present fleet with no correction in the size groupings for the tonnage that will be displaced, the percentage of vessels of 20,000 d.w. tons or over in the world fleet increases to 31 per cent. The total for vessels of 20,000 d.w. tons will be equivalent to 813.8 T-2's.

Tanker Requirements

In this review it is assumed that the Abadan refinery will resume operation to the extent of 132,000 bbl. per day in 1955 and 250,000 bbl. per day in subsequent years. It is estimated that the availability of products from this source which results in a return to more normal trade routes will reduce tanker requirements by about 10 T-2's in 1955 and 20 T-2's in the succeeding years. Also, it is assumed that there will be no further expansion of pipelines in the Middle East but that the throughput of the Iraq Petroleum Co. lines to Tripoli-Banias and Tapline to Sidon will be maintained at full capacity of 850,000 bbl. daily.

This year the European coastal movement has been included in both the requirements and tonnage availability categories since the tremendous increase in this type of movement during 1953 has been coincident with the refinery expansion in the Eastern Hemisphere. This is the reason for the revised figures shown for the year 1953 as against last year's report.

United States and foreign-flag tanker tonnage is listed in Table 4 by age as of October 1, 1954.

"I dunno—suppose it's those drill bits from the Australian Oil Supply Co?"

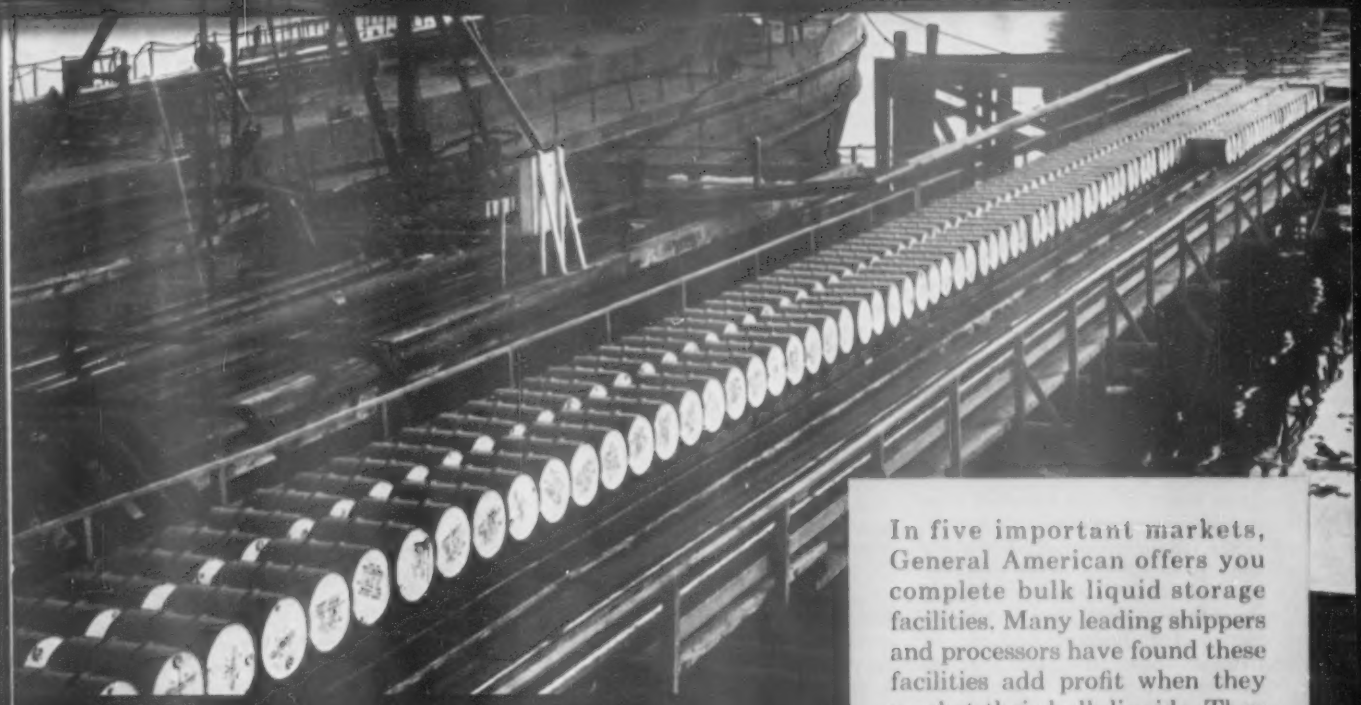
Production Record Set

A new crude-oil production record has been established in Venezuela.

Production, on a weekly basis, topped the 2,000,000 bbl. daily mark for the first time in the week ended November 15 when output averaged 2,012,048 bbl. daily. Highest previous weekly production was in the week ended December 28, 1953, when output was 1,960,453 bbl. daily.

The new production record came in the usual upturn in Venezuela output during the winter months when fuel-oil consumption increases.

Last reported monthly figure on Venezuela production listed an output of 1,911,967 bbl. daily in October. Venezuela's record high monthly production was in December 1953 when it hit 1,935,200 bbl. daily.



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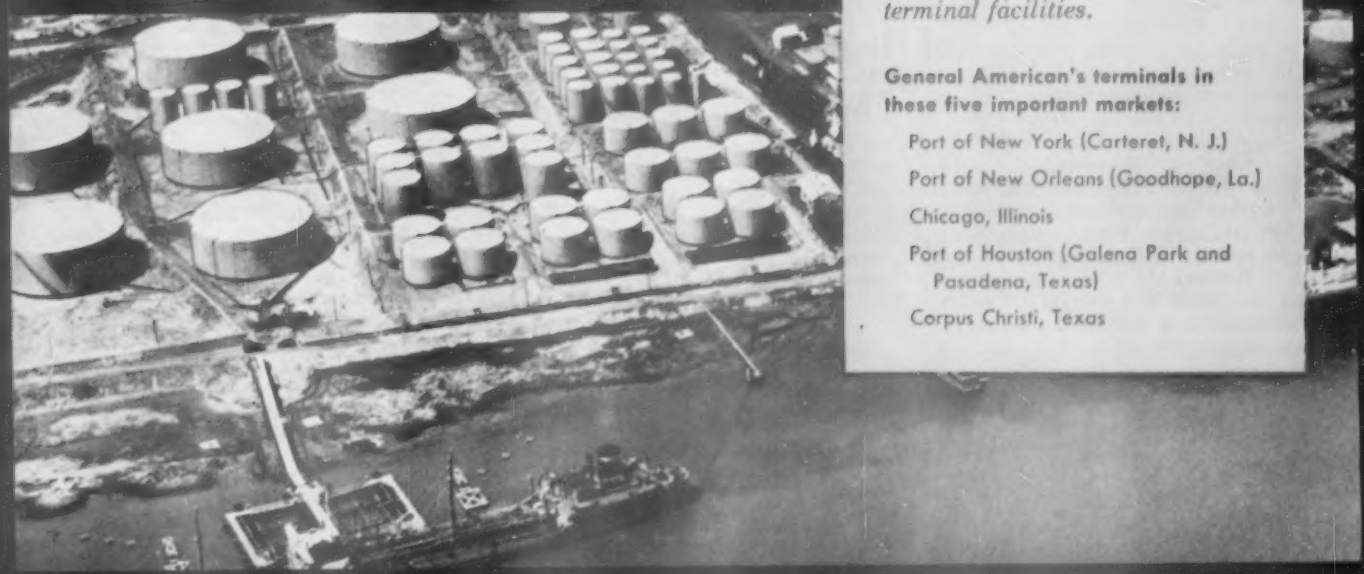

West Germany Revisited—Four Years Later

DR. GUSTAV EGLOFF
Director of research, Universal Products Co., Chicago

ON revisiting Germany, after a lapse of 4 years, it was amazing to see the boom that is going on in that country. The high tempo of activity stems not only from rehabilitation and reconstruction but from the marked growth of the economy as reflected in oil, chemical, pharmaceutical, textile, and motor-vehicle expansion.

An index to West Germany's increasing economy is indicated by its motor industry, currently producing more than 600,000 units annually, including 500,000 passenger cars and more than 100,000 commercial vehicles. The Federal Republic of Germany now ranks third in the free world's production of motor vehicles. This places it after the United States and the United Kingdom, and ahead of France and Canada. Germany also ranks third as an exporter of motor vehicles. During the first 6 months of 1954, Germany exported 132,000 cars, trucks, and buses, or 41 per cent of her output, which is a higher proportion than that of any other country except the United Kingdom.

The Germans have staged a comeback which borders on the miraculous. Four years ago I drove over many of the autobahnen roads, and they were in deplorable condition. During the war they had been thoroughly bombed and many of the bridges spanning them were out.

MOTOR VEHICLES IN USE IN GERMANY[1]

	1951	Jan.-June 1954
Motor cars	685,000	1,391,000
Motor trucks, buses	431,000	597,000
Motorcycles	1,181,000	*2,301,000

*Estimated.

MOTOR VEHICLES PRODUCED IN GERMANY[2]

	1951	Jan.-June 1954
Motor cars	276,000	264,000
Motor trucks, buses	97,000	58,000
Motorcycles	249,000	148,000

Both roads and bridges have been rebuilt and are now in excellent condition, so that the only speed limit on the driver is the capacity of his motor vehicle. With the fine roads that Germany has, motor transportation in the form of cars, trucks, buses, and motorcycles has increased to such an extent that there are a few complaints about traffic congestion.

In agricultural mechanization, West Germany is considered to be one of the most advanced nations with over 300,000 tractors in use. A majority of the tractors use diesel engines as do an increasing number of trucks, buses, and passenger cars.

The large number of diesel-operated vehicles is in part due to the high gasoline tax of 18 cents a gallon and the much lower diesel-oil tax of 5 cents a gallon. The price in Hamburg at the pump for ordinary grade gasoline is 56 cents a gallon, while diesel oil is 33 cents a gallon. The present situation indicates that gasoline is about two-thirds more expensive than diesel oil. There does not seem to be much logic to this situation, as there is an overproduction of gasoline in Germany while diesel oil is largely imported.

Two bills are now before the parliament for study. One asks for material increases in taxes on commercial vehicles, equally for gasoline and diesel vehicles, and an increase in taxes on both fuels. The other bill would limit transportation of coal, timber, cement, iron ores, grain, etc., to a maximum distance of 31 miles by autobahnen roads. These commodities would be transported longer distances by state railways. It is reported that the income from taxes would finance road building, a necessity in view of crowded German roads.

FIRST-HAND REPORT ON

West Germany's Amazing Comeback

. . . of its petroleum and petrochemical industries

by Dr. Gustav Egloff

THE West German petroleum industry has been increased fivefold since 1939. Indigenous West German petroleum production is currently at the rate of 21,000,000 bbl. a year and natural-gas production at 3,400,000,000 cu. ft. Consumption of petroleum products totaled 87,607,500 bbl. in 1953. In Table 1, the consumption of gasoline, gas-diesel oil, fuel oil, and miscellaneous products is given for 1951, 1952, and 1953.

TABLE 1—WEST GERMAN CONSUMPTION OF PETROLEUM PRODUCTS[3]
(Barrels)

	1951	1952	1953
Gasoline*	11,820,000	14,730,000	16,605,000
Gas-diesel oil†	11,445,000	13,605,000	16,402,500
Fuel oil†	3,562,500	4,642,500	6,120,000
Other products‡	35,212,500	40,230,000	48,480,000
Total	62,040,000	73,207,500	87,607,500

*Motor spirit, industrial spirits and aviation gasoline. †Gas-diesel oil corresponds to United States fuel Nos. 2, 3, and 4, fuel oil to fuel Nos. 5 and 6; excluding refinery consumption. ‡Including kerosines, lubricants, bitumen, paraffin wax, petroleum coke, gases, etc.; excluding refining consumption.

TABLE 2—WEST GERMAN REFINERY PRODUCTION[4]
(Barrels)

	1951	1952	1953
Gasoline*	11,392,500	12,900,000	15,510,000
Gas-diesel oil†	9,075,000	10,687,500	13,447,500
Fuel oil†	5,715,000	6,330,000	7,185,000
Other products‡	33,982,500	35,625,000	43,725,000
Total	60,165,000	65,542,500	79,867,500

*Motor spirit, industrial spirits and aviation gasoline. †Gas-diesel oil corresponds to United States fuel Nos. 2, 3, and 4, fuel oil to fuel Nos. 5 and 6; excluding refinery consumption. ‡Including kerosines, lubricants, bitumen, paraffin wax, petroleum coke, gases, etc.; excluding refining consumption.

Germany also consumes about 2,250,000 bbl. a year of benzene from coal carbonization in premium gasolines.

The refineries of Germany have been modernized with the latest processes, such as catalytic cracking, U.O.P. Platforming, and polymerization. Total refinery capacity has been expanded to about 82,500,000 bbl. compared to 15,000,000 bbl. before World War II. The cracking capacity of 26,250,000 bbl. is made up of 9,000,000 bbl. thermal cracking and 17,25,000 bbl. of catalytic cracking. It has been estimated that $168,000,000 has been spent for expansion since the end of World War II.

In Table 2, refinery production for 1951, 1952, and 1953 is given.

West Germany uses two qualities of gasoline for road vehicles. Regular grade has an octane number of about 80. This rating is derived from adding the research value of 84 and motor of 77 and dividing by 2. There is also a specific-gravity specification of the gasoline of 0.725. Regular grade contains tetraethyl lead but no benzene. The premium gasoline contains about 35 per cent of benzene as well as tetraethyl lead. It has a specific gravity of 0.735 to 0.740. The octane numbers range from 87 to 89. This rating is also an average, derived from adding research numbers of 90 to 92 and motor method of 84 to 85 and dividing by 2.

Lubricants . . . In 1953, the production reached 3,112,500 bbl. which includes 1,207,500 bbl. of motor oils and 1,905,000 bbl. of lubricants for industrial and other uses. Kerosine demand for lighting, heating, or tractors is relatively small. Hence, in 1953 only 345,000 bbl. was consumed.

Gasoline, diesel oils, and L.P.G. are also produced in relatively large quantities by hydrogenation. Present production from heavy petroleum residues, coal tar, etc., is carried out in converted coal-hydrogenation units which had been severely damaged by bombing during the war. As of end 1951, 9,370,000 bbl. of crude was refined in this way. Gasolines having octane ratings of 64 clear and of 81 with 2.5 cc. of tetraethyl lead are produced. Operations in the converted plants are conducted at about 4,500 psig. and tungsten disulfide catalysts are used. Hydrogen consumption varies widely with the feed stock used.

German Petrochemical Industry

The West German output of chemicals, mainly aromatics derived from coal carbonization, is growing rapidly. The German government itself plans to aid the country's chemical industry by investing about 120 million dollars in expansion. Nearly a quarter of this is set aside for plant reconstruction. Several companies are expanding production of petrochemicals based upon natural gas and petroleum. They are studying uses of ethylene, propylene, and butylenes, now being produced in relatively large quantities from thermal and catalytic cracking.

The writer talked to a number of chemical groups, some of whom expressed the belief that they may have overlooked the potentials of aliphatic chemistry far too long. West Germany is finding and producing more natural gas and petroleum and, in addition, is importing crude oils. In view of their installations of thermal and catalytic cracking which produce olefinic hydrocarbons, there is a good potential source of petrochemicals. Heavy-oil hydrogenation produces substantial quantities of L.P.G., also used as raw materials for petrochemicals.

Dr. W. A. Menne, president of the Association of Chemical Industry in the Federal Republic, states that the output of olefins, i.e., ethylene, propylene, and butylenes from domestic cracking operations, is expected to total 1,125,000 bbl. during 1954.

Ethylene . . . One of the prime interests of the chemical industry is in the production of ethylene from natural gas and petroleum. In the past, the chemical industry's supplies of ethylene were obtained mainly from coke-oven gases which contained about 2 per cent of ethylene. However, the volume of coke-oven gas is governed by the coke production in the carbonization of coal, which in turn depends upon the steelmaking industry. In the past, deficiencies have been overcome primarily through the hydrogenation of acetylene, but this is more expensive than producing ethylene from crude-oil fractions or natural gas. Dr. Menne believes that oil-derived ethylene will find its greatest uses in ethylene oxide, ethylene glycol and polyethylene. It is reported that the first polyethylene plant will be installed by the Rheinische Olefin Werke, which is owned jointly with Deutsche Shell A.G.

Three former coal hydrogenation plants at Gelsenberg, Wesseling, and Scholven will contribute 25,000 tons a year of saturated hydrocarbons from the high-pressure hydrogenation of petroleum residues.

An intensive study is being made by several large chemical groups trying to get back into the GR-S synthetic rubber industry. According to the West German Economics Ministry, two proposals are now under consideration in this matter. It is reported that the Huels company will either choose to process 375,000 bbl. a year of butane to be bought from the United States or will decide to process 1,425,000 bbl. of crude oil itself to produce the butadiene needed for GR-S rubber manufacture. The objective is to raise GR-S output which has recently been limited to 6,000 tons a year. Another proposal, shunted aside for the present, is to purchase ethyl alcohol from France and convert it to butadiene. This latter process is more expensive than dehydrogenating butylene from catalytic and thermal cracking to butadiene or dehydrogenating butane to butylene to butadiene.

Acetylene . . . Acetylene in Germany is derived in part from natural gas. About 1,620,000,000 cu. ft. of natural gas, or about 45 per cent of the total West German natural gas of that year, was used for acetylene production in 1953. A 50-mile pipeline carries natural gas from the Bentheim gas fields to the Huels plant. This gas plus refinery gases from the Emsland refinery at Lingen, are subjected to the electric-arc process, which appears to be more expensive than partial-oxidation or high-temperature cracking of gas or oil as used in the United States to produce acetylene.

Although benzene is derived essentially from coal carbonization, there is a potential petrochemical source in catalytic reforming. There are now three U.O.P. Platforming units in Germany which are or will be operating to produce high-octane motor fuels and could be operated to produce benzene, toluene, and xylenes. These units have a total charging capacity of 15,600 bbl. a day.

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1. Petroleum Press Service, October 1954, p. 378.
2. Petroleum Press Service, October 1954, p. 378.
3. Petroleum Press Service, July 1954, p. 239.
4. Petroleum Press Service, July 1954, p. 240.

AIR DRILLING—GAS LIFT

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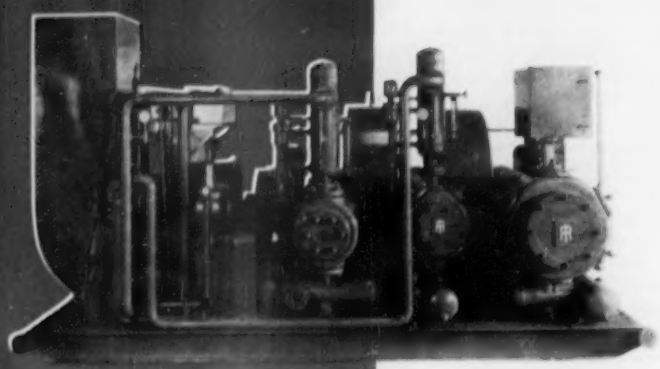

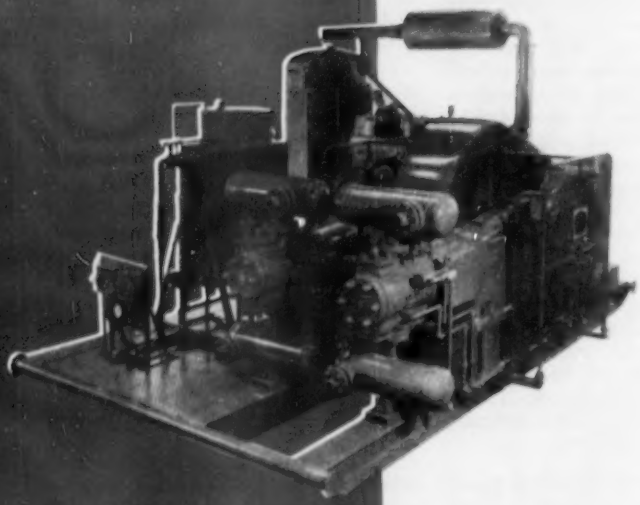

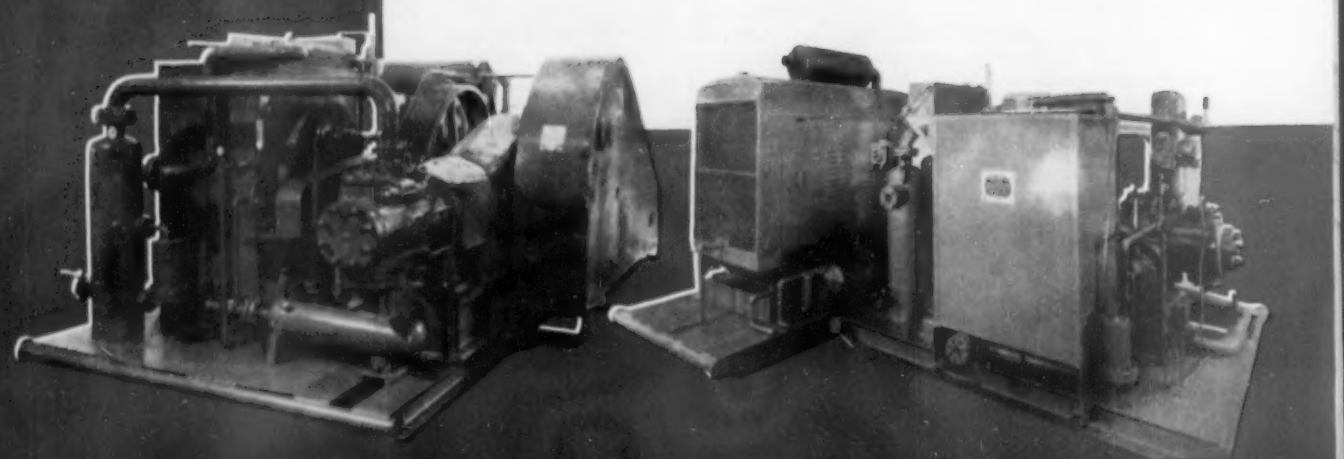

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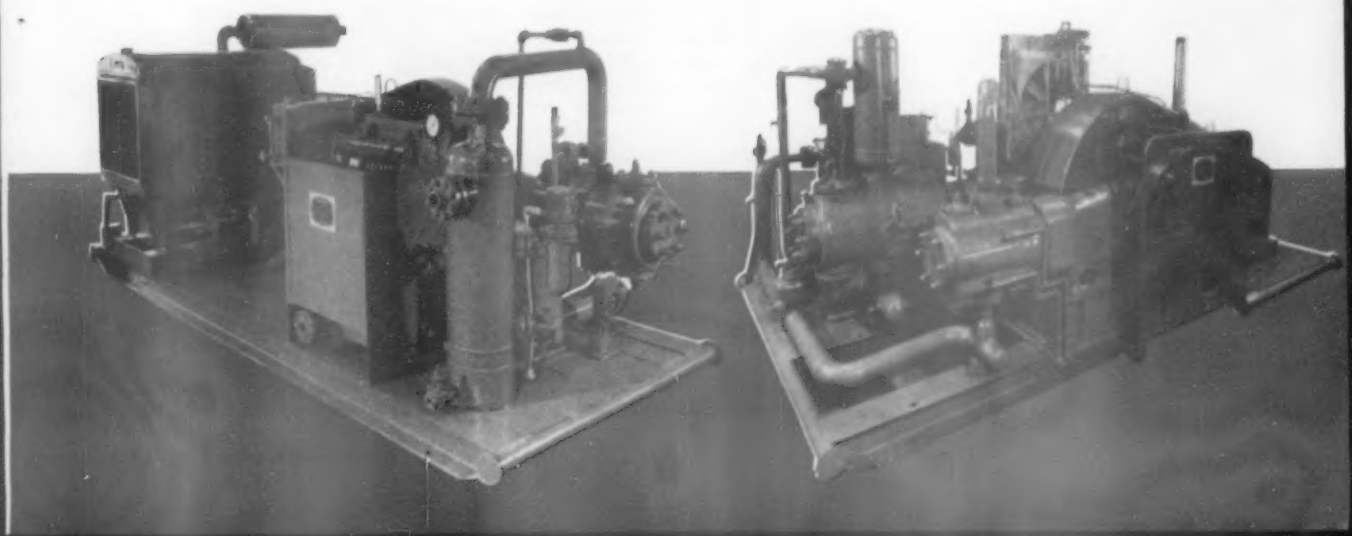


DISCOVERY WELL at Parentis, the most prolific discovery ever made in any territory under the French flag.

R. P. Walters, general manager, and A. Martin, production manager, for Esso Standard S.A.F.

Parentis Find Stirs French Oil Hopes

. . . opens new era in nation's petroleum industry

by Dr. Maurice Moyal

DISCOVERY of oil at Parentis set off one of the greatest waves of excitement in France since the liberation of France.

The most prolific oil discovery ever made in any territory under the French flag, Parentis field may prove to be the most significant on the entire continent of Europe. Already it has awakened the spirit of national pride, and it promises to help the struggling French nation recover its economic equilibrium.

Premier Mendes-France recently estimated that French production, mainly from this new source, will be able to meet 25 per cent of the country's petroleum needs within 4 years. At present, the country produces a paltry 4 per cent of the oil it consumes.

Rapid development of Parentis field since its discovery early this year has kindled hopes that France may be the depository of far greater oil wealth than was previously suspected. Although the full potentiality of the Bordeaux or Aquitaine basin in southwestern France has not yet been ascertained, geologists already are taking another look at the Paris basin and other regions of France in hopes of finding more oil-bearing formations.

Author is petroleum correspondent, Marseilles.

Exploratory Work for Parentis

Esso Standard Societe Anonyme Francaise (Standard of New Jersey affiliate) spent nearly 3 years conducting extensive geological, geophysical, gravimeter, magnetometer, and seismograph surveys in southwestern France before tapping the big Parentis reserve. Its exploratory work was concentrated in the company's triangular-shaped concession area, covering the northern section of the Landes sand dunes, with its apex at the Gironde River estuary.

Esso's first test in its 4,300,000-acre concession was an 8,827-ft. dry hole on the anticline near Mano, about 45 miles northwest of Mont-de-Marsan. This well, in the southwestern part of the concession, followed several core tests and helped to amplify findings of previous reconnaissance work.

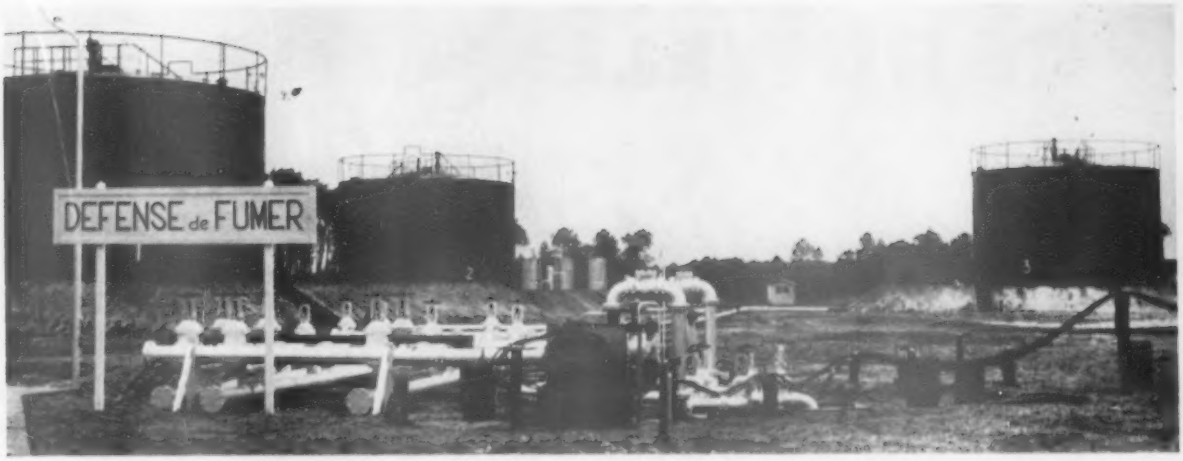
The 1 Parentis was spudded late in 1953 on another promising structure, located on a seismic survey, in the vicinity of the Biscarosse Lagoon and near the now-famous village of Parentis near the Atlantic Coast. For want of a heavier rig, drilling was halted at 6,700 ft.

A rig capable of drilling to greater depths later was sent in from the United States. On March 22, 1954, oil shows were detected on log at 7,248 ft. A drill-stem test resulted in a good oil flow from the interval at 7,344-77 ft. On initial test through quarter-inch choke, the discovery produced oil at the rate of 175 cu. m. (about 1,100 bbl.) per day.

To probe the total depth of the oil-bearing horizons, 1 Parentis was sunk deeper. But drilling was stopped at 7,812 ft. because of the deep fissures encountered. Even so, logs disclosed oil stains over a total interval of about 520 ft.

Production of 1 Parentis is steadily on the upgrade. It reportedly rose from 375 cu. m. (2,325 bbl.) per day in July to 560 cu. m. (3,475 bbl.) in September.

Parentis production is a high-grade crude with very low sulfur content and a specific gravity of 0.856° (about 34°



STORAGE TANKS at Parentis field. To the end of September the field had yielded 309,000 bbl. of oil.

A.P.I.) It yields a high percentage of gasoline.

The Parentis discovery opened a new era in the French petroleum industry.

Oonce the possibilities of a continuous production were sufficiently established, Esso Standard took steps to move the Parentis crude to its own refinery at Port Jerome, in the Lower Seine area roughly halfway between Le Havre and Paris. A new catalytic cracking unit recently was erected at this refinery, which has a capacity of about 2,6 million tons per year (52,000 bbl. daily).

The operator also is considering the feasibility of constructing a crude line to reduce the cost of moving crude to the refinery. The National Railways Administration now takes the equivalent of about $6 a ton for moving the crude to Port Jerome.

The proposed pipeline would extend from Parentis to Verdon, on the estuary of the Gironde River. From there, the crude would be moved by tankers to Port Jerome. Use of the pipeline-tanker route is expected to reduce the transportation cost by as much as $3.50 a ton.

Although Esso Standard is not offering any crystal gazing regarding the future of Parentis, the company is expected to start construction of the Parentis-Verdon pipeline as soon as a yearly crude production of 5,500,000 bbl. is reasonably certain.

At present, a 2-mile, 6-in. crude line links the storage tanks with the railhead at Parentis. The tank farm recently was enlarged to boost its capacity from 3,000 to 5,000 cu. m. Two additional tanks with a capacity of 10,000 cu. m. each have been ordered and are scheduled to be erected by March.

Estimates of Parentis field production for 1955 vary widely. One high official forecast an output of 7,400,000 bbl., while another spokesman predicted a production of 15,000,000 bbl.

Other officials, still more sanguine, speak of erecting on the spot a synthetic-rubber plant to utilize still higher production.

Although the future of Parentis is uncertain, the field already has given the country's anemic oil industry a shot in the arm.

From the first test flow March 22 to end of September, Parentis yielded 49,939 cu. m. (309,000 bbl.) of crude. September's production accounted for nearly half of the total output.

The refinery at Port Jerome started processing Parentis crude in July with a throughput of 86,392 bbl. the first month. In September, throughput jumped to 152,770 bbl.

Esso Standard is now drilling a series of exploration and extension wells in a methodical effort to establish definite boundaries of the new productive area.

Its 2 Parentis, ¾ mile southwest of the discovery, struck oil at 8,835 ft., but was shut in after unsuccessful tests.

The 3 Parentis, ¾ mile west of No. 1, found production at 7,647 ft. At last report, it was yielding an average of 550 cu. m. (3,410 bbl.) of oil per day.

Other tests have been staked to the north, east, and west of the established productive area.

THIS LOCAL STATION was scheduled to be closed until the Parentis discovery brought it a new lease on life.

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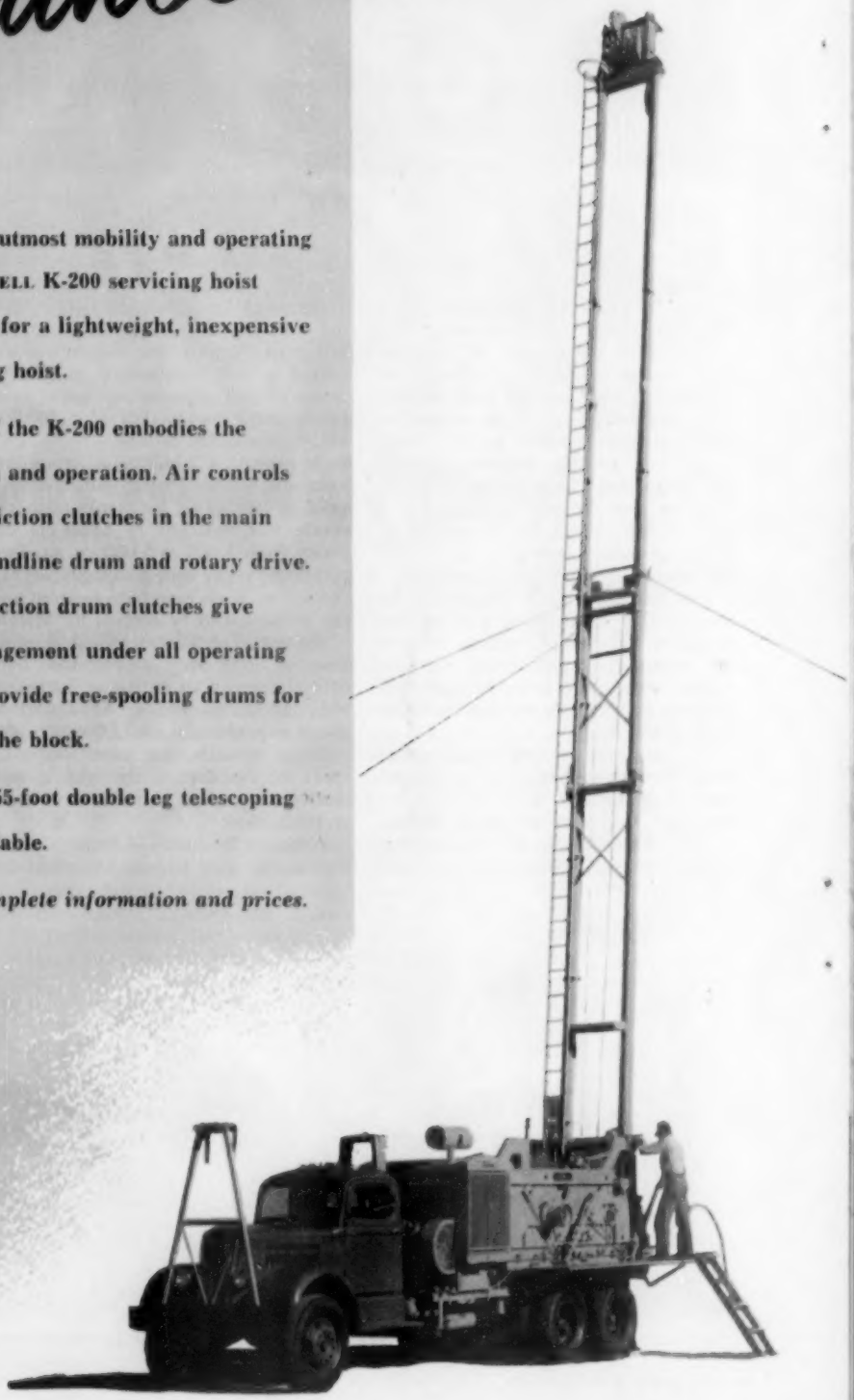

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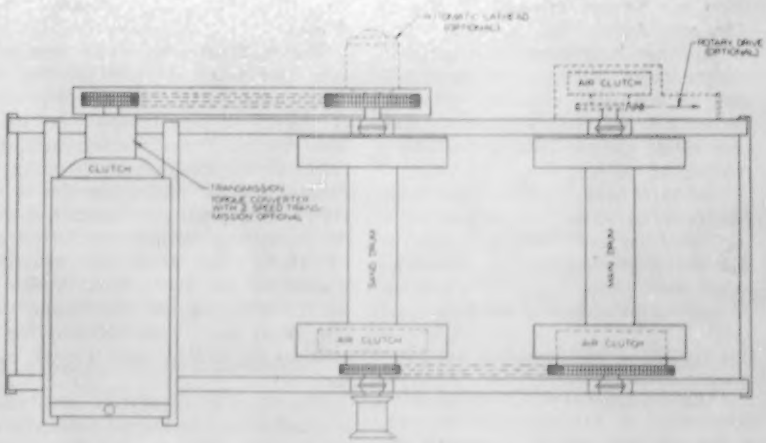

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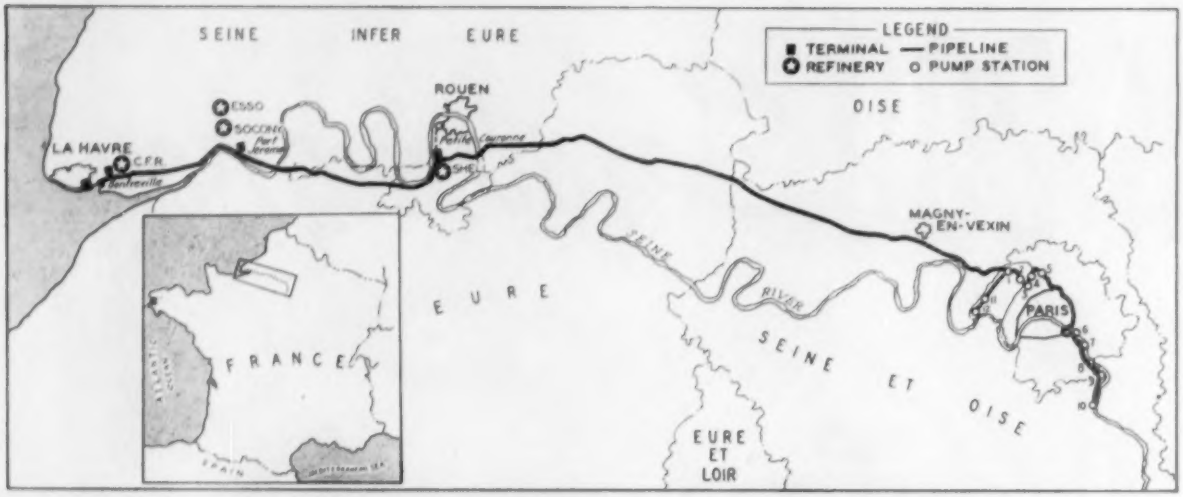


EUROPE'S most important pipeline—the recently completed 150-mile, 10-in. Le Havre-to-Paris line for finished products. Fig. 1.

France, Germany, and Italy are the sites of . . .

New Pipelines for Europe's Booming Needs

. . . Here are the basic facts of their design and operation

by F. B. Porges

THE spectacular postwar increase in European demand for petroleum products has stimulated construction of three major pipelines in Italy, Germany, and France. All of these were completed within the last 2 years.

The Italian pipeline is designed to convey crude oil from Genoa to the Condor (Societa per L'Industria Petrolifera e Chimica) refinery situated at Rho near Milan. In Germany a pair of pipelines have been constructed to carry both crude oil and finished products between the cracking plant of Deutsche Erdoel A.G. at Hemmingstedt near Heide and the port of Brunsbuettelkoog on the Kiel Canal.

The third new pipeline runs from Le Havre to Paris. Its purpose is to feed fuel oil and various grades of gasoline from four French refineries in the lower Seine region to a number of distribution centers in the Paris area.

1. Le Havre-Paris Pipeline, France

The most important pipeline of those constructed in Europe since the war, is the one now operating between the channel port of Le Havre and the Paris area. This 150-mile 10-in. line can certainly lay claim to being the longest yet constructed in Europe; it was also the first European pipeline for finished products to go into service, if one excepts those temporarily laid down during the last war. Commercial operation commenced early in 1953 after a construction period of only 2 years and the line is now supplying the Paris market with gasoline and diesel oil at an annual rate of rather more than 8 million barrels.

Author is with Flexibox, Ltd., Manchester, England.

The construction of this enterprise was undertaken by the Societe des Transports Petroliers par Pipe-Line (TRAPIL)—a joint company set up in 1950 by the French Government, the principal oil companies operating in France, and the port authorities of Le Havre. It is principally concerned with the transportation of motor fuels from Le Havre and from the refineries situated in the lower Seine Valley to the Paris region for distribution and sale in an area which accounts for at least 20 per cent of total French consumption.

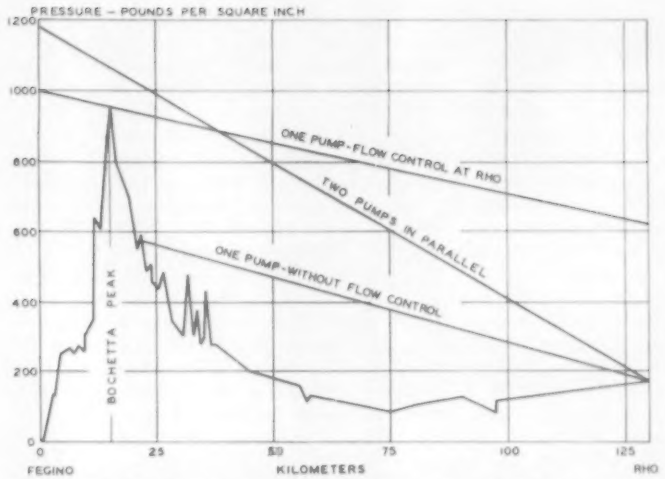
The refineries concerned are situated at Gonfreville (Compagnie Francaise de Raffinage), at Port Jerome (Esso-Standard and Socony-Vacuum Francaise) and at Petit Couronne (Shell-Berre). Fig. 1 illustrates the relationship between the refineries, the pumping stations, and the terminals of the line.

Pipeline route . . . For the major portion of its journey the pipeline stays fairly close to the River Seine. However, in order to obtain the shortest possible route, the line has to cross the Seine at several points as well as certain of its tributaries and some canals. The overland sections are contained in a 30-in.-deep trench while the river and canal crossings pass, in general, below the bed.

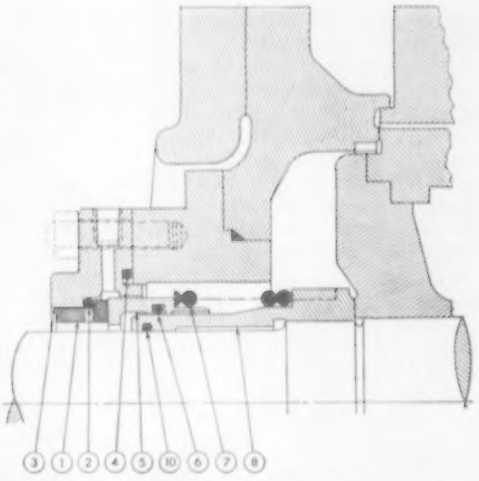
The pipeline is composed of a single string of tubing with a nominal diameter of 10 in. and a wall thickness of ¼ in. In particularly exposed places, for instance at the various river crossings, the wall thickness has been increased to ½ in. and the piping duplicated as a safety measure.

A 10-in. pipeline was considered to be the most economical proposition for a maximum annual throughput of 12 million barrels, resulting in a pump discharge pressure of 1,000 psi. at Petit Couronne. The throughput could be increased to 16 million barrels per annum by building an additional pumping station in the neighborhood of Pontoise (see Fig. 1).

The pipes themselves conform, in the main, to A.P.I. Grade B specification. They are protected by a layer of bituminous enamel armored by spun-glass-fiber tape. This insulation has



HYDRAULIC GRADIENTS for Italy's Condor pipeline. Notice the unusual and difficult nature of the terrain encountered between Fegino and Rho. Viscosities of crudes ranged from 45 to 200 S.U.s., and due to elevation differences, higher viscosities were experienced in the line itself than at the pumping station. Fig. 2.



MECHANICAL SEALS used in the Genoa-Rho pipeline—identified parts are: (1) stationary seal ring; (2), (4), and (6) static seals; (3) seal cover; (5) rotary seal ring; (7) seal spring; (8) shaft sleeve; and (10) shaft seal. (Drawing courtesy Flexibox, Ltd.) Fig. 3.

made it possible to provide cathodic protection at low cost.

Pumping stations . . . There are pumping stations at Port Jerome, Gonfreville, and Petit Couronne which are fed by the refineries listed above but can also act as booster stations for through-transports. Another station is situated at Le Havre to take care of cargos received there by sea. The pipeline is normally used in the other direction for exports coming from refineries.

The 2,950-r.p.m. centrifugal pumps of 1,600-bbl. per hour capacity are partly of Guinard, partly of Worthington manufacture, and fitted with three or four stages. They are powered by electric motors of 300 hp. The piping arrangement is such that the three pumps in each station can be operated individually, in a series of two, or, if necessary, in a series of three.

The pipeline enters the Paris region at Gennevilliers. Here it divides into two branches, one running southwest and the other southeast. Along these arms are placed the distribution centers of the individual oil companies participating in the scheme. Each center is equipped with tankage for clean and contaminated products, water separators, filters, recording volumetric counters, etc.

Operational cycles . . . At the moment the products conveyed by the Le Havre-Paris pipeline include diesel oil and several grades of gasoline. At some future date other materials, such as aviation fuel and liquefied petroleum gases, may be handled.

In order to insure that customers receive at the right time the correct amount of specified fuel from the particular refinery concerned, dispatches are arranged in regular cycles occupying 14 days. Gasoline is followed by super gasoline, super gasoline by gasoline, gasoline by diesel oil, diesel oil by gasoline, and so on. Contaminated plugs are diverted to special tanks and reinjected into the line at a low rate in order to keep the products to specification.

The necessity of supplying a large number of depots (32) with individualized cargoes coming from four different refineries has led to great complexity in the matter of planning and dispatching.

Two Guinard pumps of the same type and size as those fitted to the TRAPIL pipeline are also employed in the Le Havre-Petit Couronne line constructed by the Shell-Berre company and taken into commercial operation in 1952 in order to feed its refinery near Rouen with crude oil. The pumps can be operated singly or in series. Next to them in the same pump house are installed two booster pumps which can also be operated in series if necessary. The pumps are fitted with mechanical seals of the same design of those employed in the main pumps but, in view of the low stuffing-box pressure, it was not necessary to arrange for the partial balancing of the product pressure as is usual in pipeline pumps.

2. Hemmingstedt-Brunsbuettelkoog Pipeline, Germany

After a total building time of only 20 weeks, a pair of pipelines connecting the cracking plant of Deutsche Erdoel A.G. at Hemmingstedt, near Heide, in northern Germany with the port of Brunsbuettelkoog, on the Kiel Canal, were placed into operation in August 1953. One of the lines brings crude oil to the refinery while the other conveys gasoline and diesel fuel in the reverse direction to Brunsbuettelkoog for further transportation by barge to the consuming centers of western Germany.

The total distance between the two end points is just under 20 miles. This is subdivided into three sections of about equal lengths and there are, therefore, two intermediate isolating stations. One of these is situated at St. Michaelisdonn and the other at Meldorf.

The larger of the two lines is of 6-in.-diameter pipe and has a capacity of about 380 bbl. per hour of crude oil while the smaller line, of 5-in. pipe, can handle up to 360 bbl. per hour of fuel.

Terrain . . . Since the countryside in Schleswig-Holstein is comparatively flat, construction problems were not severe. The maximum difference in levels encountered was only a few feet. Nor, in view of the nature of the soil, was it necessary to provide stuffing boxes or expansion loops. Any small amounts of expansion or contraction caused by differences in temperature are taken care of by suitable curving of the lines in both the horizontal and vertical planes.

On completion, both pipelines were subjected to hydraulic tests under pressures of 1,420 and 1,140 psi. respectively.

Two pumping stations . . . The crude oils of local and Middle East origin handled by the 6-in.-diameter pipeline vary in viscosity between 1.6° and 3.4° Engler at 20° C. Such a comparatively

narrow range has obviated any need to heat the oil being moved. It has also made it possible to manage with only one pumping station and this is situated at Brunsbuettelkoog. According to season and temperature of the soil, the line pressure varies between 425 and 850 psi. However, in order to care for higher viscosities and allow a margin of safety, the main pump is of the positive-displacement type and suitable for pressures up to 1,280 psi. It is driven by an electric motor.

There is also a standby centrifugal pump which shows an efficiency of 70 per cent under normal operating conditions when the discharge pressure is 710 psi. Its steep characteristic makes it possible to achieve higher pressures with smaller deliveries when starting up.

The 5-in. fuel line is served by three Halberg centrifugal pumps, situated at Hemmingstedt, one of which is used when pumping gasoline while two are operated in series when handling diesel fuel.

All centrifugal pumps are fitted with mechanical seals of the same design as those employed on the Genoa-Rho pipeline. Shaft diameters are 1.772 and 1.378 in. at Brunsbuettelkoog and Hemmingstedt respectively. Each pump is fitted with the same type and size of seal on both the inboard and outboard ends.

3. Genoa-Rho Pipeline, Italy

The main Genoa-Rho pipeline of 12-in. diameter extends from Fegino, some 2½ miles from Genoa harbor, to Rho, a distance of about 80 miles. There are also two 15¼-in.-diameter pipelines installed between the tanker unloading jetty and Fegino itself. These can be operated independently in order to permit discharge from two tankers simultaneously. They pass first to a booster station and then to Fegino where the main pipeline pumps are located.

Booster station . . . The tanker-unloading facilities are required to handle a wide variety of crude oils with kinematic viscosities varying from 0.054 to 0.410 stokes. This part of the program is based on a maximum throughput for each of the two lines to Fegino of about 5,500 bbl. per hour.

At the booster station advantage is taken of the possibility of operating the tanker cargo pumps to give as high a discharge pressure as possible, up to around 100 psi. The inlet pressure to the station may normally vary, therefore, over a range of 0 to 100 psi. Provision is also made for a possible trend towards increased discharge pressure from tanker cargo pumps of modern design.

Four Sigmund 10 by 12-in. single-stage pumps with horizontally split casings are installed in the booster station. At 1,450 r.p.m., each is capable of providing its maximum efficiency performance of 5,500 bbl. per hour when generating a net pressure of 50 psi. Two pumps are intended to operate on each 15¼-in. pipeline, and may be run singly or in series as required to suit varying rates of unloading. In this manner rates of flow varying from 3,200 to 6,900 bbl. per hour can be provided.

Two pumps are driven by 200-b.hp. direct-coupled flameproof motors. The remaining two are driven by 214-b.hp. 750-r.p.m. multicylinder two-cycle diesel engines, each provided with its own integral radiator system. Drive from engine to pump is by V-belts. A flameproof fire wall separates the engine-motor room from the pump house.

Main line pumping station . . . From Fegino to Rho, situated at 115 and 575 ft. above sea level respectively, the pipeline route lies over the Bocchetta peak, rising to a maximum height of about 2,600 ft. above sea level. The unusual and difficult nature of the terrain will be noted from Fig. 2, which shows the typical hydraulic gradients of this line. The pumping temperature varies between 42° and 82° F.

The Fegino pumps, with a suction pressure of from 5 to 50 psi., are required to discharge crude oils whose viscosities vary from 45 to 200 S.U.s. Owing to the high altitude of a considerable length of the main pipeline, higher viscosities are experienced in the line itself than at the pumping station. Hydraulic gradients were, therefore, planned to deal with maximum line viscosities of 330 S.U.s.

There are three fully interchangeable six-stage pumps of the vertically split-section type, each designed to handle a mean rate of flow of 1,015 bbl. per hour when generating a net pressure of 1,050 psi., corresponding to a net generated head of 2,800 ft. The pump characteristics are stable under all rates of flow. Each pump is driven by an 850-b.hp. totally enclosed flameproof motor running at 2,950 r.p.m. on three-phase, 50-cycle, 3,300-volt supply. They are designed to run singly, two in parallel, or three in parallel. Normal throughput is based on working conditions with two pumps running. Provision has been made for the installation of a fourth unit at a later date.

"This belt feels funny since I put it on."

Obviously, by operating the pumps in these different combinations, varying throughput rates can be achieved. For example, with one pump only the rate of flow when handling crude oil of 100 S.U.s. corresponds to approximately 1,140 bbl. per hour. With two pumps in parallel this figure increases to 1,750 bbl. per hour.

The pumps are of the multistage diffuser type and of cast-steel construction throughout. They are designed for a test pressure of 1,800 psi. Hydraulic balance valves and independent thrust bearings are provided.

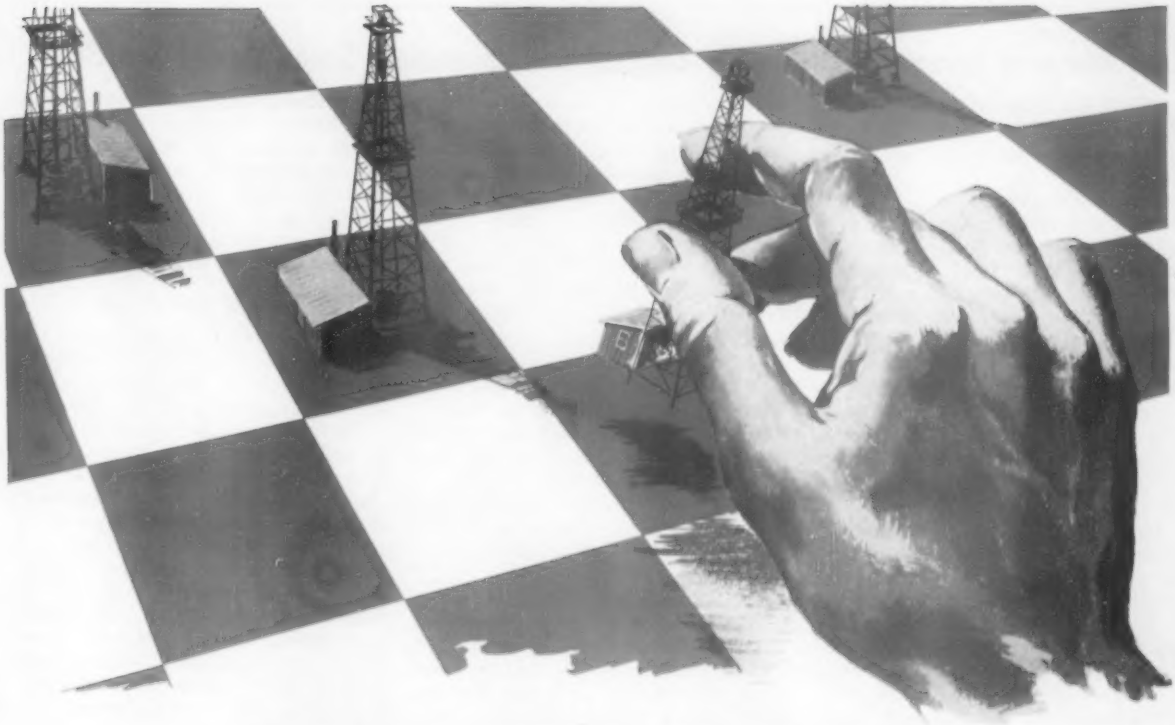
Mechanical seals . . . The pipeline pumps are equipped with mechanical seals. The type and size of seal, illustrated in Fig. 3, are the same for both the inboard and outboard end of each pump. Shaft and effective sleeve diameters are, in this case, 2.677 and 3.248 in. respectively.

The seal consists essentially of two seal rings, (1) and (5), intimate contact between the faces of which prevents leakage from the pump to which the seal has been fitted. The stationary seal ring (1) is made from self-lubricating compounded carbon, the rotary seal ring (5) from stainless steel with a Stellited sealing face. The stainless steel spring (7) furnishes the necessary pressure between the seal faces and provides at the same time for positive yet resilient drive of rotary seal ring.

Mechanical seals have also been fitted to all Sigmund pumps and to the jackshafts traversing the wall boxes in the firewall of the booster station. Complete standardization has been achieved by using the same make of seal in the pipeline installation as in the refinery itself.

The Condor pipeline has proved itself as a complete success and is in continual operation feeding crude oil from incoming tankers to the parent refinery. It was planned by the owners themselves with the guidance of several consultant technicians.

Responsible for the working out of the complete scheme was H. E. Charlton of Petrocarbon, Ltd. Actual pipeline construction was handled by W. G. Heltzel of Tulsa. Pumping plant and pipeline characteristics were specified by N. Tetlow, consultant engineer of Manchester, England.



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Western Europe, Traditionally Laggard in Exploration, Steps Up Oil Search

WESTERN EUROPE is the most concentrated world market for petroleum products outside of the United States.

Annual consumption in the countries forming this area is constantly increasing, and today the demand for crude in these countries is nearing a total of two million barrels per day. The demand could be even greater if the price of petroleum products were lower. Not only the consumption by individuals for automobiles and heating, but, above all, industrial usage of petroleum products, particularly for agriculture, could be greatly increased if a lower selling price for these products made them more accessible.

First-grade automobile gasoline sells at around 75 cents per gallon in western Europe. The selling price of other petroleum products is in proportion. Thus, as far as petroleum is concerned, western Europe today constitutes the second world market, and this market is being supplied at a very high price.

The reason for this high price is evidently that western Europe produces only a small fraction of the petroleum it needs. In fact, in 1953 the average total daily production of the democratic European countries did not quite reach 70,000 bbl. per day—that is, less than 4 per cent of the total crude these nations imported.

European countries, notably Germany, England, France, and Italy, increased their refining capacity considerably after the war in order to reduce the deficit of their trade balances. This cut down the value in dollars or sterling of the products imported. It also created a source of currencies for whatever finished products could be exported. Nevertheless, the fact is that these refineries must be supplied with crude coming 96 per cent from two far-distant sources: the Persian Gulf and Venezuela.

Since the international prices of petroleum are based on the value f.o.b. Gulf of Mexico, prices in Europe amount to the base increased by the cost of transportation from the Gulf of Mexico to the port of entry. So the "second world market" is being supplied with crude oil costing more than $3 per barrel at any of the ports of unloading.

Such a situation exists because no oil is produced in large commercial quantities between the Persian Gulf and the Caribbean area. And yet there is no valid reason to believe that no source can be found within that area. In fact, some old fields are still producing in the U.S.S.R., Poland, Rumania, Austria, and even at Pechelbronn, in the east of metropolitan France. If new fields have not been discovered, it is simply because no extensive program of exploration has been carried out until recent years outside of the areas already established as oil provinces.

The reasons for this lack of interest are probably many, and may differ for the various European countries. It seems, however, that in the past no important exploration work has been undertaken except by the countries favored with a high standard of living and good political security: first of all the United States, and perhaps Canada.

Lack of Risk Capital

Oil exploration is costly, and the necessary capital, so-called speculative or risk capital, is not available except in wealthy countries. The European countries were in no position until now to add to their other expenses those of searching for the oil that their sedimentary basins may contain. Capital in these nations could not be found easily in the face of political instability and international unrest. And local nationalism made it impossible to replace the reluctant national capital with foreign participation, especially from the American, Dutch, or English, as was being done in other regions considered perhaps geologically more promising.

For all these reasons, little oil exploration had been accomplished in Europe before the end of the last war. It is purely a recent development that, since petroleum is becoming more and more essential to the defense and the economy of the nations, serious efforts have been progressively undertaken for the exploration of the sedimentary basins which exist all around the Mediterranean Sea.

Oil Companies Look to France

Parentis strike sparks broad exploration plans, dispels pessimism

by Roger Henquet

DISCOVERY of Parentis has given France's exploration effort a much-needed shot in the arm and has dispelled earlier misconceptions concerning the nation's oil possibilities. Oil companies are now anxious to enter the country because of this field and other recent encouraging indications of possible oil production.

Parentis, with an average daily output of 3,000 bbl. from only three wells, accounts for one-third of the nation's domestic production. The discovery well flowed over 15,000 bbl. of 35° gravity oil on early tests.

Author is with Société d'Etudes Pétroliéres, Paris, France.

History of Exploration in France

Oil prospecting work in metropolitan France is a postwar development. Until 1938, it was generally conceded that there was no petroleum in France. It is difficult today to understand why such a false idea was accepted by many and sometimes even taught in the universities. Added to the fact that, before the war, the oil requirements of France perhaps did not seriously upset its economic balance, this skepticism explains why petroleum exploration was not conducted more actively. However, the presence of petroleum in metropolitan France was known because the French has been exploiting Pechelbronn since 1918. This field was under the management of a civil company that was formed in 1921 and was the owner of the only petroleum concession granted up to the present in France. This old field is still producing, but now yields less than 800 bbl. per day

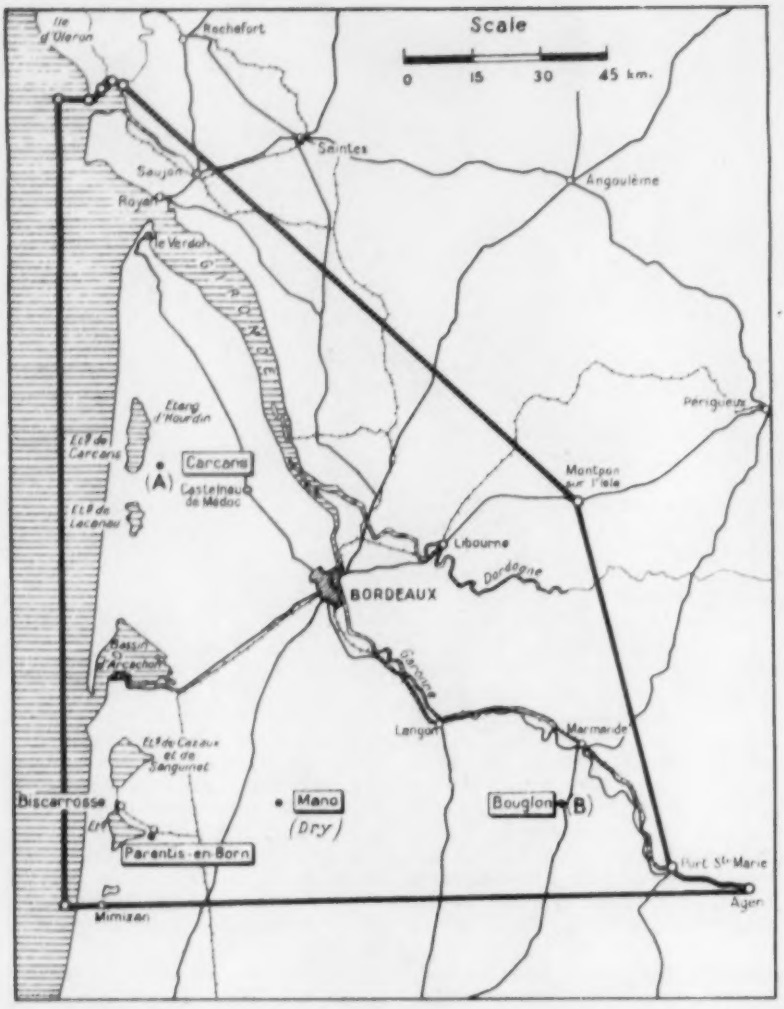
FRANCE: Sedimentary basins and boundaries of permits granted or applied for; permits granted to Esso Standard and FROPEX are indicated by shading. Fig. 1.

of a heavy, sulfurous crude. A large part of the production comes not from wells but from the mine which was the first oil-mining project ever completed.

In the course of the first World War, the importance of petroleum was evidenced by frequent shortages due to delays in transportation by sea. These shortages could have been critical for the conduct of military operations. Consequently, a commission was formed in 1923 for the main purpose of organizing the exploration of the subsurface in metropolitan France and in the Colonies. Some exploration was undertaken under the new commission, but in a rather sporadic manner. In 15 years, only 200,000 ft. of hole was drilled in metropolitan France. The results were rather meager; the only discovery was that of the field of Gabian, eventually turned over to the S.N.P.L.M., a company in which the state is the principal shareholder. The exploitation of this field has been discontinued as no longer profitable.

State ownership of minerals . . . It has been advanced that the slow progress of the work might be due to the fact that the underground resources in France belong not to the landowner but to the state. This is not a very good reason. Incidentally, one might make the remark that this disposition of the law, practically universal outside of the United States, was introduced in France at the time of the French Revolution. It is thus a democratic and rather recent consideration that what cannot be seen at the surface should belong to the community and not to the landowner. It could be thought that the present controversy in the United States on offshore rights arises from similar considerations, and that perhaps the solution to the problem is not so obvious.

Finally, at this time of high taxation, the matter of ownership does not seem to be of such great moment. Whether it be the state or the individual who



Parentis field information, and boundary of concession sought by Esso Standard from Government of France. Fig. 2.

owns the title, the operator will turn over to the state an appreciable share of his profits, and in the end it is the state which often retains the greatest share of the underground wealth.

Thus it seems that it is not this legal aspect of the problem which has delayed oil exploration in France. Rather, for the reasons indicated above and valid for all European countries, the cause has been lack of enthusiasm on the part of private enterprise for petroleum investments.

French exploration efforts . . . In 1939, the commission of 1923 was replaced by the **Direction des Carburants,** which is actually an undersecretariat of the Ministry of Industry and Commerce. Some strong measures were then taken to replace lacking private capital and to promote exploration through the grant of subsidies by the state. An oil company owned 100 per cent by the state, the **Régie Autonome du Pétrole** (R.A.P.), was incorporated by decree in July 1939 for the development of the gas field of Saint-Marcet, just discovered north of the Pyrenees Mountains. During the war, this field was developed very slowly. The daily production of 6,000 M.c.f. in 1945 was progressively increased during the following years and now totals 25,000 M.c.f.

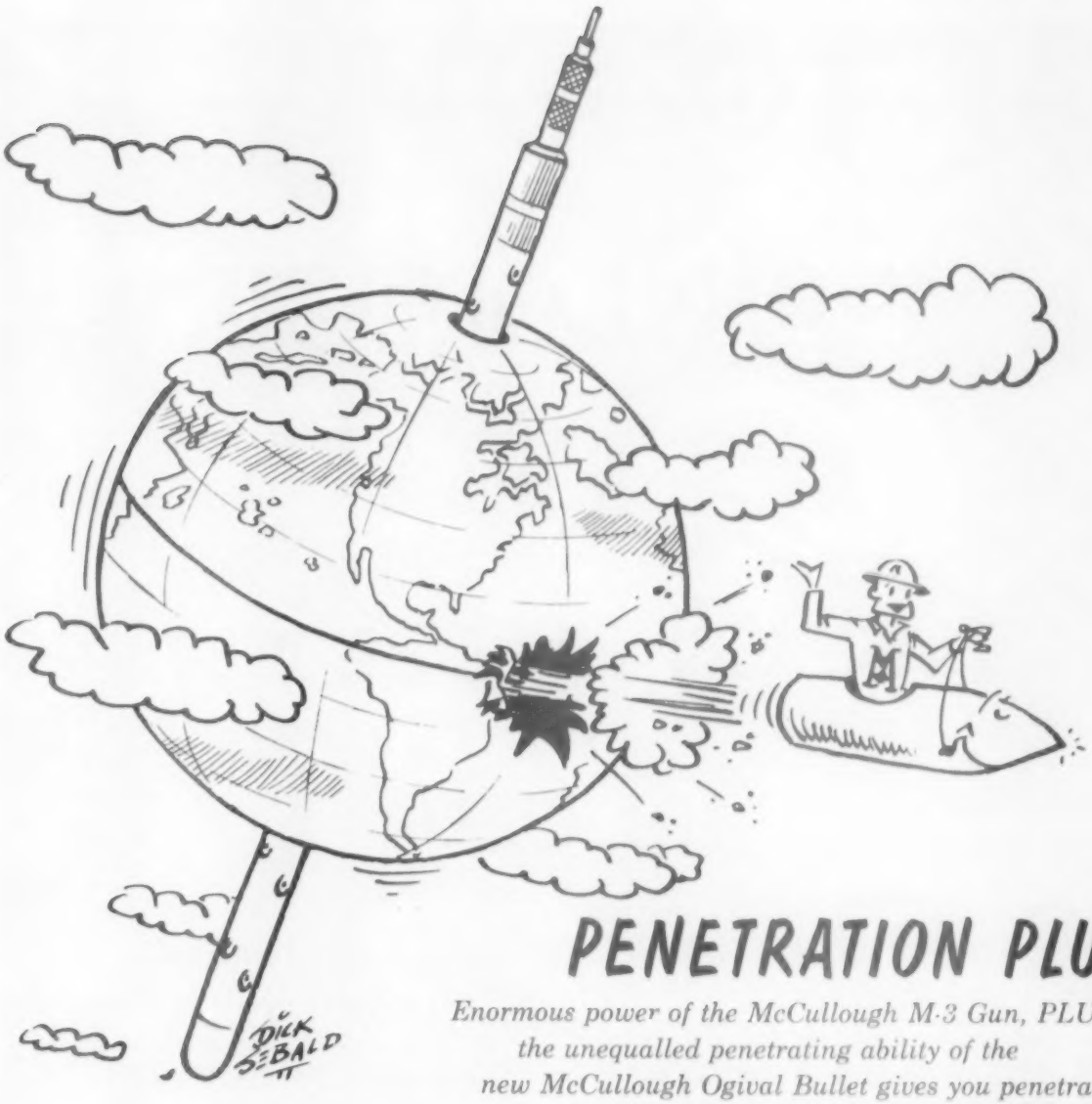
The year 1945 really marks the beginning of the modern period of intensive progress. It was then that the **Bureau de Recherches de Pétrole** (Office of Petroleum Exploration, since in French "oil research" means "oil exploration") was set up, to be especially responsible for establishing a national exploration program, and provided by the state with the necessary funds for the realization of this program. The second World War again had emphasized the military importance of petroleum and the need for the European countries to be able to depend on a national production. The need was even more acute in France, where reconstruction was requiring large imports of equipment and basic products. The trade balances showed great deficits, of which petroleum products accounted for a large part. The economic recovery of the nation demanded a rapid exploitation of whatever resources could be developed.

Early results discouraging . . . In 1946, a first 5-year plan was put into effect, by which a total of approximately 200 million dollars was to be expended in oil exploration. Two new companies had then been formed, the S.N.P.A. in November 1941 and the S.N.P.L.M. in June 1944, in order to proceed respectively with the prospecting of the Aquitaine and Languedoc Mediterranean basins. The majority of the shares of these two companies had to be subscribed by the state from the funds allocated to petroleum subsidies.

When the first plan came to an end in 1951, once again success was small. It is true that the field of Lacq, north of the Pyrenees and west of the gas field of Saint-Marcet, had been discovered by S.N.P.A. in 1949, but at the end of 1951 the daily production of this field reached only 5,000 bbl. of a paraffinic and sulfurous petroleum of little commercial value.

Exploration successes forecast . . . These meager results, however, did not discourage the administration, and a new 5-year plan was established. In this new program, the investments for exploration during the next 5 years were to be twice those of the previous plan, or approximately 400 million dollars. In its report for the year 1953 the **Bureau de Recherches de Pétrole** indicated that, as a result of this increase in investments, oil exploration had been accelerated, the preliminary work was completed, and 1953 should eventually prove to be a milestone in the history of oil exploration. It predicted that important discoveries could be expected in the near future.

A few months later, Esso Standard discovered near Parentis, in Southwest France, a first-class oil field and confirmed in spectacular fashion the optimistic report of the administration. This important event in itself was a great reward for the perseverance of the French oil men. The extent and the value of the field obviously cannot be ascertained before the completion of additional work. But already three wells are in production and, merely through production tests, flow on the average more than 3,000 bbl. per day—one third of the production in metropolitan France. The crude is of an excellent grade, has a gravity of 35°, and contains no sulfur. The accompanying map (Fig. 1) shows the location of the



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field and the boundary of the concession applied for by Esso Standard. This application is presently under consideration.

Private enterprise . . . In its report for 1953, the B.R.P. confirmed its regret that private enterprise did not contribute more heavily to the financial efforts made by the state in the field of petroleum. And yet, some important developments had taken place since 1946. During 1953 most of the exploration work was done, not in metropolitan France, but in North Africa. Of a total of 23 seismic crews active at the end of the year, only 9 were working in metropolitan France, the remaining 14 were overseas.

The sedimentary basins south of the Mediterranean Sea, particularly in Tunisia and Algeria (Sahara Desert), had attracted the attention of foreign companies. Gulf (American) and Shell (Anglo-Dutch) participated heavily in the North African oil companies. This departure from the obsolete prewar nationalism created at the time a certain political agitation. But, in the end, the principle of cooperation with foreign private capital was accepted. Esso Standard obtained in February 1951 a permit for developing 4.2 million acres in the Aquitaine basin, north of the area previously granted to S.N.P.A. Hence, little by little, international private groups were joining Pechelbronn and **Compagnie Francaise des Pétroles** (the company formed to manage the French participation in I.P.C.) on the list of private enterprises able to supply, besides the state, capital and technicians. The competition to result therefrom could not fail to give results.

Recent encouragement . . . Four months after the discovery of Parentis, in August 1954, the R.A.P. produced good-quality oil from a depth of 1,500 ft. at Gournay-en-Bray, at the northwest boundary of the Paris basin. Production was only 500 bbl. of oil in 5 days before water entered the well. The discovery cannot be called commercial, but nonetheless is of great interest, as it proves the possibility of oil in the entire Paris basin.

This new success was quickly followed by numerous applications for new permits. These applications overlap in some cases. The administration eventually will have to make the decision, but up to now there is no reason to believe that previous liberal policies will be changed. In fact, American Petroleum Overseas only recently formed, in association with S.N.P.L.M., a new company, FROPEX, to apply for a five-million-acres exploration permit in the south of the Paris basin. It may not be altogether a coincidence that, outside of Pechelbronn and the Compagnie Francaise des Pétroles, both formed for the development of known fields, the second private oil company entering France is, like the first, Esso Standard, one of associated American and French interests.

Other oil companies will certainly follow to seek permits in the sedimentary areas still available for exploration in France. The map (Fig. 2) shows the location of these basins and the boundary of the permits already granted or applied for. The permits granted to Esso Standard and requested by FROPEX are indicated by shading. The other areas, left blank, are those under consideration by companies with capital entirely French.

Geology . . . French sedimentary basins can be ranged in four groups (Fig. 2):

1. **Aquitaine basin,** north of the Pyrenees Mountains, between the Central Mountains and Brittany (proved oil-bearing by Saint-Marcet, Lacq, and Parentis).

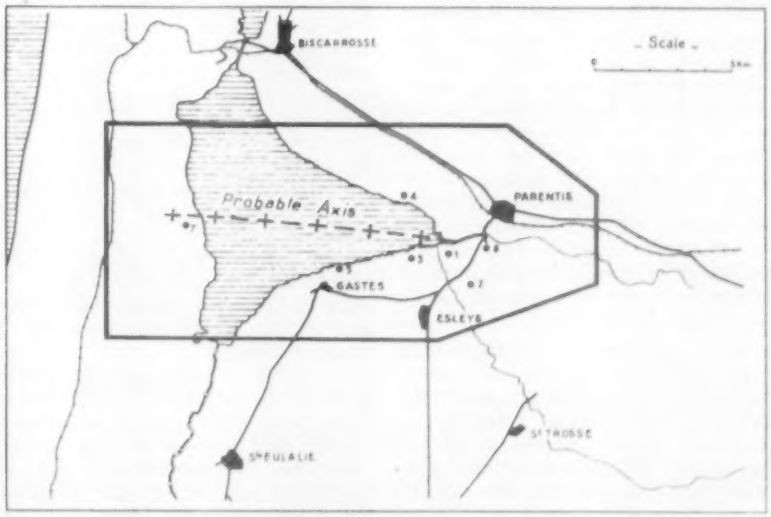
2. **Paris basin,** between Brittany, the Central Mountains, the Vosges, and the Ardennes (proved oil-bearing by the Alsatian fields and the Gournay show).

3. **Languedoc Mediterranean,** between the Central and the Alps Mountains.

4. **Rhone, Saone, and Rhine basins.** While the indications of oil are several for the latter two groups, it would be premature to designate their basins as petroleum provinces.

In all these basins, Tertiary formations are found at the surface, and the possible oil objectives are in the Jurassic, Trias, in certain cases the Permian, and perhaps the Carboniferous and Devonian. The main objective is the Jurassic, which contains the most productive reservoir in Central and Western Europe. It is this reservoir which is producing in Pechelbronn as well as in Lacq and Parentis.

The extent of the sedimentary terrains in metropolitan France can be appreciated from the map. The area of France is approximately 212,000 sq. miles, of which more than 100,000 cover sedimentary formations that may be oil-bearing. As shown on the map, many permits have already been applied for, but large areas are still open for new ventures. In addition, as will be seen below, the large permits granted in the past, when French oil was highly problematical, will be reduced in size as they are renewed. The sections returned to the state will become available again to the various companies operating in France. It is most likely, then, that the number of French oil companies, as well as the percentage of private capital in their corporate funds, will increase quite regularly during the coming years.



Parentis area, showing anticipated structural trend of field. Fig. 3.

Technical Problems of Exploration

Oil operations in France are conducted on high standards of technical ability. Exploration and drilling proceed with methods and an efficiency which would not be expected in a country with so little production. The French Petroleum Institute **(Institut Francais du Pétrole)** pursues theoretical and practical laboratory research, and has contributed original ideas to the art. Various South American countries have called upon the Institute to assist in the planning of similar organizations of their own. As one of the most advanced techniques of the group, one may mention photogeology, for which original field practice and rapid and precise methods of interpretation have been fully developed.

Many American oil men visiting

French operations have been surprised at the exploration and drilling records. The following examples are typical:

1. Seismic parties working in France (C.G.G., Seismos, S.S.C.) shoot currently 200 stations per month (Ed. note: This performance compares favorably with that of many Mid-Continent crews).

2. In the Aquitaine basin, S.N.P.A. drilled, this summer, two wells to a depth below 7,000 ft., with a daily average footage of 130 ft. More than 150 ft. of cores were recovered in each of these two holes.

3. In the Paris basin, at Courgivaux, a wildcat was drilled by R.A.P. in 187 days, to a depth of 10,500 ft. This includes 70 cores and 24 formation tests.

4. In Alsace, S.N.P.L.M., early in 1954 drilled a well in 78 days to almost 6,000 ft. with 30 cores and 5 formation tests.

Costs high . . . If, on the average, drilling in metropolitan France is expensive, blame cannot then be placed on the quality of the work. High costs are merely the result of too small an activity, scattered over too large an area. The French operators, furthermore, are anxious to constantly improve their techniques and reduce costs through cooperation with foreign technicians. During the recent negotiations between American and French groups for the processing of permit applications, the easy exchange of techniques and of operators stood out as an important factor and one of the necessary conditions for the conclusion of an agreement.

The Legislation of Exploration Permits

The Napoleonic Code remains the basic legislation in France and French overseas territories for coal and ore mining. Several changes and additions made since the first World War, however, have facilitated the delivery of the exploration permits. Furthermore, in order to attract private capital to the oil industry, the parliament in 1953 voted tax exemptions similar to those existing in the United States. As a result, now that the presence of oil has been ascertained and political security appears greatly improved, France can be considered as one of the most attractive countries for petroleum investments.

Exploration permits easy to acquire . . . The state, owner of the underground resources, is responsible to the nation for their efficient and rational exploitation. Like any proprietor, it possesses a discretionary right as to the choice of the contractors to whom it wishes to grant exploration permits. This right is all the more justified in that these permits do not entail the payment of any royalty. They only call for a certain amount of work.

The essential concern of the Government when investigating applications is to make sure that the applicant has the technical and financial ability to explore efficiently the area which he requests. Outside of this, little is required, and it is only a custom that the recipient of a permit must be a French entity. Theoretically, the capital can be entirely foreign; its incorporation into a French company is to satisfy the French that the stockholders will be subject to the laws of the country without any chance of international complications.

Administration of the permits . . . The exploration permit is valid for a period of 5 years. It may be dropped at any time by the operator, who, on the other hand, cannot lose it as long as he does the work agreed upon prior to the grant.

After the first 5 years, the permit can be renewed twice for similar periods of 5 years, but on each renewal the Government may reduce by half the area granted.

During the validity of the exploration permit, only its owner can obtain an exploitation permit or a concession for the commercial development of the pools eventually discovered within the area. The exploitation permit is an intermediary step between the exploration permit and the concession. Its purpose is to permit the owner of an exploration permit who discovers a pool to market the oil produced while, for the purpose of obtaining a concession, he carries on the work necessary to establish the extent and the value of the pool.

The concession . . . It is indeed only when a pool is to be developed that a concession may be signed between the state and the owner of the permit. The concession is an individual contract between the two parties, to be entered into in each case upon special consideration of all the factors involved. Only during this last stage can the state capitalize on its rights as a proprietor, since, during the two previous regimes, the owner of the permit was not subject to any special tax or royalty. He had only to pay the usual taxes on eventual profits, as would have any other commercial enterprise.

Only two petroleum concessions have been granted so far by the French Government (to Pechelbronn and to the Compagnie Francaise des Petroles), and precedents will not necessarily be followed. It is likely, however, that even during the concession the share of the state will be paid through taxation on profits, including a progressive surtax based on the amount of the capital invested.

Parentis . . . It may be that the intermediary step of the exploration permit will tend to disappear. Esso Standard requested a concession over the estimated extent of the field as soon as a second producer confirmed the Parentis discovery. The area requested covers approximately 38 sq. miles, whereas the size of the exploration permit is almost 6,800 sq. miles. The Parentis concession applied for represents, then, only 0.5 per cent of the permit granted in February 1951.

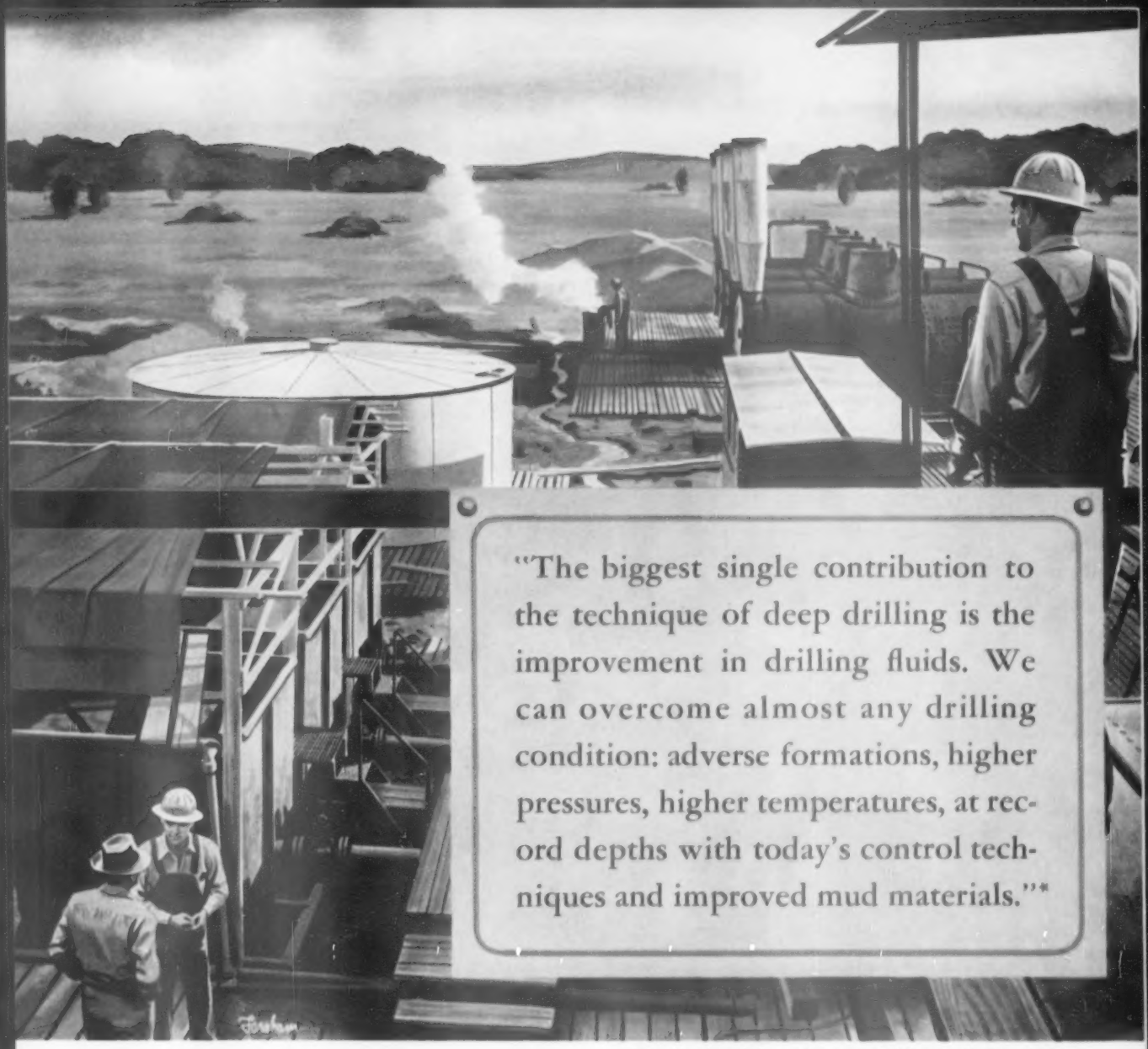
France, as said above, has the option during February 1956 of reducing by half the extent of the original permit. It is thus of paramount importance for Esso Standard to conduct exploration as rapidly as possible. It is only during the validity of the permit that the owner has a preferential right on the oil found, and he must act quickly if he does not wish to risk losing a great deal. The production tests made recently on the discovery well at Parentis have established that it can flow 15,000 bbl. per day through a 1-in. choke. Such a figure makes one think of the Near East, and must be highly pleasing to those who, in spite of so many failures, refused to give up exploration for oil in France. Such a figure is also for Esso Standard a mighty incentive for the quick adoption of an extensive program of work.

Premium on rapid exploration . . . French law, then, tries to force the owner of a permit to work efficiently and fast. On the other hand, as already indicated, fiscal advantages voted last year make it more attractive to invest in oil and to spend money quickly for a rapid evaluation of the area. These advantages can be analyzed briefly as follows:

1. The cost of petroleum exploration may be capitalized and amortized over a period of 5 years. Unprofitable investments may be written off immediately.

2. The exploration companies may set up, for depletion of the pools, a reserve free from tax equal to 27.5 per cent of their net income. This reserve, however, cannot exceed 50 per cent of the net profits of exploitation and cannot be distributed as dividends. It must be applied to further exploration expenditures in the course of the 5 years following.

3. Certain persons and companies investing in the exploration of petroleum may, under certain conditions, receive title to twice the number of shares they have subscribed, the second half being paid for in their behalf by the state from funds allocated to oil exploration.



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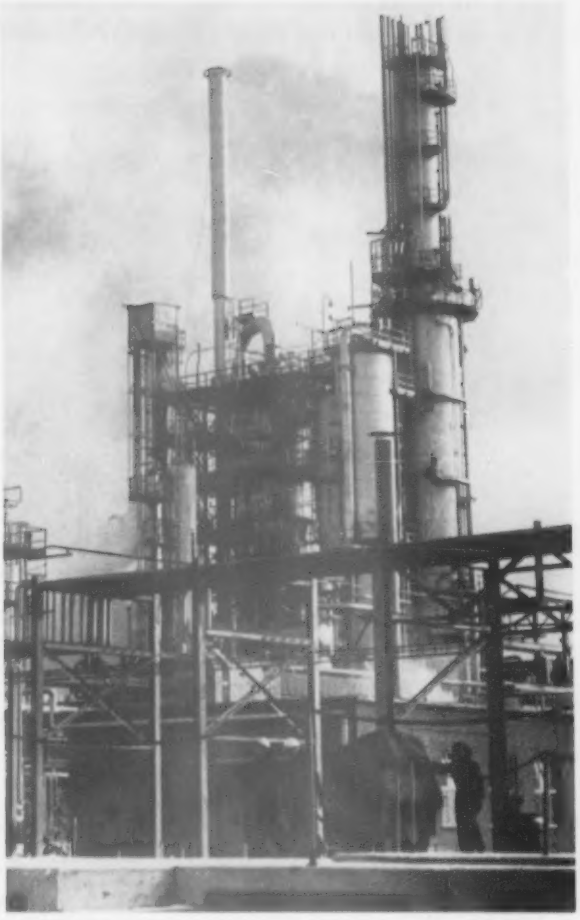


NEWLY ERECTED catalytic cracking plant of Esso AG at Hamburg-Harburg.

Expanded Drilling and Refining Activity Boosts West German Oil Operations

Last 12 months have yielded a dozen new oil and gas fields

by A. M. Stahmer

OIL companies active in West Germany in 1954 succeeded in making a series of new discoveries in all exploration areas of the country.

For the first time commercially exploitable oil and gas deposits were discovered in the Bavarian Molasse basin as the result of intensified geophysical investigations and wildcatting.

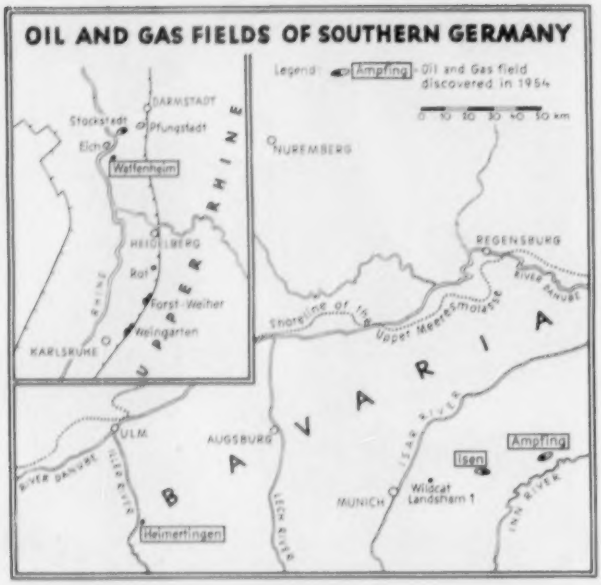
A new direction has been given to the search for oil in Northwest Germany after various oil deposits in Hanover and Holstein had been found, which structurally belong to the stratigraphic trap type.

Again, just as reported in the 1953 International number, a dozen new oil and gas finds were made during the last 12 months, some of which may improve considerably the reserve situation of the country.

Author is head, Erdol-Informationsdienst, Hamburg.

The crude-oil output which amounted to 44,514 bbl. daily a year ago, had risen to 54,275 bbl. daily in September 1954. A further steady increase up to 60,000 or even 70,000 bbl. can be expected.

About 130 deep-drilling rigs are at present in operation in West Germany, among which there are some modern American types as well as new designs of German equipment factories. During the first 9 months of 1954, 368 deep wells with a total footage of 1,600,840 had been drilled, of which 245 or two-thirds struck either oil or gas.



For the whole of 1954 a total footage of 2.2 million feet is estimated, i.e. 23 per cent more than in the preceding year. The big share of exploration wells is particularly notable. In the first few months of the current year nearly half of the total drilling footage was sunk in wildcats and extension wells.

Bavaria—A New German Oil Province

Twenty years ago Bayerische Mineral-Industrie AG., a subsidiary of Socony-Vacuum Oil Co., started the first geophysical investigations in the Bavarian Inn district, the area between the rivers Danube and Inn. Now, after several unsuccessful deep drillings had proved the difficult conditions in the search for oil in the Molasse basin, the Deutsche Vacuum Oel AG. operating on behalf of the Bayerische Mineral-Industrie, at the end of January 1954 finally succeeded in discovering natural gas at 5,710 ft. near the base of the Tertiary. The discovery well is located near Ampfing, 50 miles east of Munich, in a concession area in which, apart from the BMI, Gewerkschaft Elwerath and Preussag also are participating. Further drilling operations have showed that here, on a local elevation on a fault zone extending from east to west, the gas cap of an apparently large oil reservoir has been encountered. This thus records the first gas and oil find of major importance in the Bavarian part of the Molasse basin. Apart from the wildcat 2 Ampfing, three additional wells were successful in the meantime, of which wells A.4 and A.5 in a structurally deeper position came in as oil producers with a daily output of 10-15 tons crude (specific gravity 0.930-0.932) through a ⅛-in. choke. Of special significance is the level position of the oil horizon, indicating a larger extent of the reservoir. In the discovery well 2 Ampfing the oil-saturated sand of the Tertiary was encountered at a depth of 5,710 ft. In the well 5 Ampfing, situated 3 miles farther west, the same horizon was found only 200 ft. deeper. In the two wells located in between, corresponding depths to pay zone were measured.

Almost simultaneous with the Ampfing discovery another well came in on the local structure of Isen, situated about 15 miles farther west. Here, too, in the first well (1 Isen) of Deutsche Vacuum Oel AG.-BMI, gas was discovered, this time at a depth of 5,920 ft. in the Oligocene. In mid-October the second Isen well, located 2 miles east of the exploration well, met an oil pay in the lower stratum of the Lithothamnia limestone, near the base of the Tertiary at 6,560 ft. Swabbing tests yielded a flow of 63 bbl. of heavy oil in 10 hours with a specific gravity of 0.948. At the same time gas was discovered in the same sand as in 1 Isen.

For a long time the Deutsche Schachtbau- und Tiefbohrgesellschaft has been trying to discover oil in the part of the Molasse basin situated north of Lake Constance. In June, oil traces were found in a well of the Schachtbau near Heimertingen, north of the small town of Memmingen. At the end of October swabbing tests in an extension well, 3 Heimertingen, yielded a crude-oil flow of 7.5 bbl. per day (specific gravity 0.848) from a Molasse horizon called the Baustein zone, at 5,020-30 ft. Further exploration will show whether Heimertingen can be classified as a commercial find.

The oil district in the German part of the Upper Rhine Valley, output of which was insignificant for a great number of years, has made further progress since in 1952 Gewerkschaft Elwerath and Deutsche Erdoel-AG. developed some gas and oil fields in the region south of Darmstadt. During the past few years the daily oil production of the Upper Rhine Valley increased from 810 bbl. to about 1,500 bbl., mainly as a result of the continued exploitation of the Stockstadt field. At the end of April 1954, Gewerkschaft Elwerath discovered a small oil field near Wattenheim, 8 miles south of Stockstadt field (on the right bank of the Rhine River). In the wildcat 1 Wattenheim the oil-impregnated Pechelbronn strata were found at 7,550 ft., wielding about 60 bbl. of crude daily through a ⅛-in. choke. In the old Weingarten field, situated farther south, a new pay (Rhaetic) has been explored. In several wildcats near Karlsruhe, production tests are presently being carried out.

About the middle of this year regular production was established in the gas field of Pfungstadt south of Darmstadt, which had been discovered by Deutsche Erdoel-AG. The gas is conveyed by a 26-mile pipeline to Farbwerke Hoechst (formerly a part of IG. Farben) where it is used for the manufacture of petrochemicals. On the strength of a contract between Gewerkschaft Elwerath and the Badische Anilin- & Soda-Fabrik (also formerly IG. Farben) early in 1955 the supply of gas will be started through a pipeline system connecting the gas wells in Stockstadt and Eich with the BASF works at Ludwigshafen. Here as in Hoechst, the gas is to be used as raw

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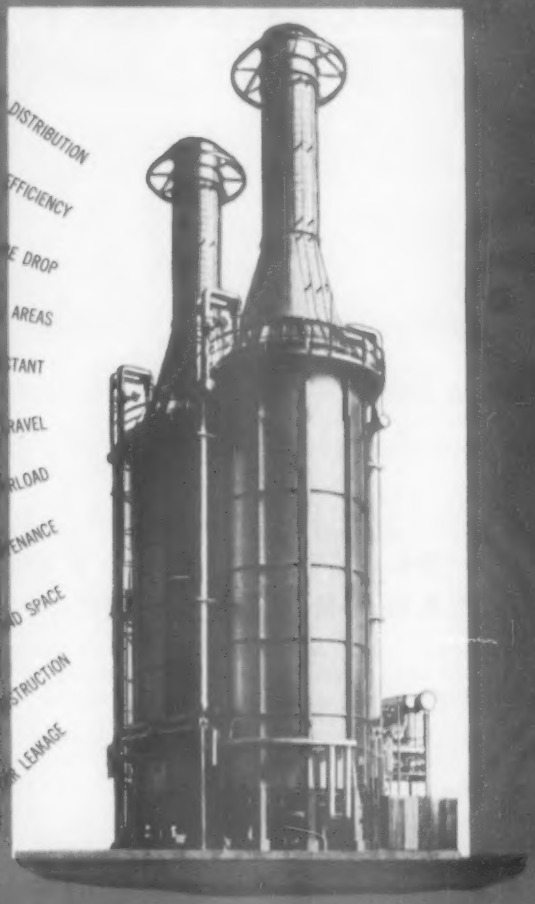

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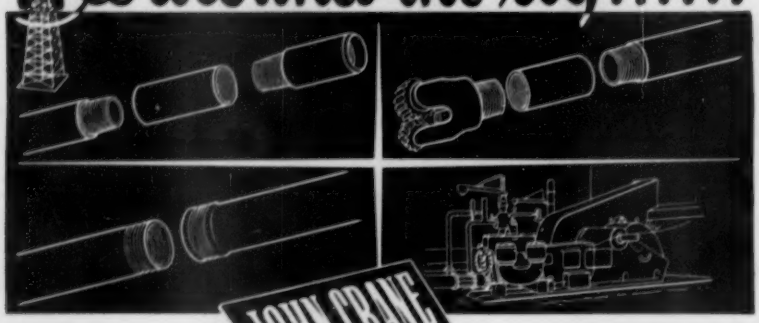

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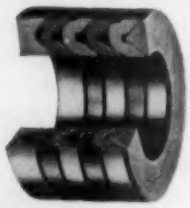

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Stratigraphic Traps Discovered

Stratigraphic traps are the last cry in oil geology and oil exploration in Northwest Germany. The year 1954 started off with the prolific oil find at Hankensbuettel, which has in the meantime developed into an oil field the output of which already exceeded that of the old production districts of Heide, Steimbke, or Wesendorf. The largest part of the new field, which, interrupted by fault zones, possibly extends up to neighboring Hohne field, lies within the concession area of Deutsche Erdoel-AG. However Gewerkschaft Elwerath, Preussag, Vacuum, and Itag also are participating. In late January in the discovery well 1 Hankensbuettel an 80-ft.-thick, highly permeable oil horizon was encountered in the Dogger (Jurassic) at 5,200-80 ft. Through a ⅛-in. choke the well produced 257 bbl. daily of light oil (specific gravity 0.858). Similar results were achieved by extension wells. Up to now, more than 600 productive acres have been explored. Hankensbuettel is a stratigraphic trap. The sands of the Dogger are cut off by the transgression of the Alb.

In the trend of Hankensbuettel field the oil deposit of Oerrel-Sued was discovered by Deutsche Erdoel-AG. in July. Oerrel-Sued is situated in the region between Hankensbuettel and Hohne, but it is apparently separated from Hankensbuettel by a graben zone. Up to now two wells at Oerrel have taken production from the Dogger sandstone at 4,500 ft. Extension wells are under way, and further exploration will show whether Oerrel is directly connected with Hohne.

A series of new finds which up to now seem to be of only little economic value were made this year in the southern part of the Hanover oil province. From the geological point of view the oil deposit of Ruehme (5 miles north of Brunswick), discovered by the consortium Gewerkschaft Elwerath-Preussag, is of special interest. Like Hankensbuettel, Ruehme is a structure of the stratigraphic-trap type which has accumulated in an out-thinning Dogger horizon below the transgressing Lower Cretaceous.

Almost at the same time another oil find was made on a block on the eastern edge of the salt dome of Broistedt-Rolfsbuettel near Vechelde, 6 miles west of Brunswick. The wildcat well 2a Vechelde of Elwerath-Preussag met an oil-bearing sandstone of the middle Rhaetic at a depth of 5,990-6,010 ft. On the western flank of the same salt dome a production test in the wildcat well 1 Meerdorf, sunk by Gewerkschaft Elwerath as early as 1953, resulted in a flow of gas and condensate from the Dogger sandstone at 4,900 ft. Some miles farther to the west the 2 Schmedentedt well of Deutsche Vacuum Oel AG. struck oil and gas in the Dogger on the northeast flank of the Oberg structure. This may be classified as a field part or extension of Oberg.

In September, south of Kronsberg field (which was discovered in 1953 near the town of Hanover) the consortship Elwerath-Vacuum-Wintershall, in their wildcat well 2 Pattensen, were successful in finding oil at a depth of 1,970 ft. in the Cornbrash. The well, which initially flowed 45 bbl. crude per day, will soon go to pump. Pattensen may be an extension of Kronsberg field in southern direction.

Wintershall A.G. discovered two new oil deposits north and east of their Aldorf field in the recently developed Weser-Ems oil district south of Bremen. Both these new fields, Bockstedt and Dueste, are producing from the Valendis (Lower Cretaceous). Bockstedt was discovered at the end of January 1954 when the wildcat well, 2 Bockstedt, came in at a depth of 3,850-80 ft., flowing about 300 bbl. per day. In contrast to Bockstedt, Dueste, which is situated 3 miles east of Aldorf field and which was discovered in early October, is a true stratigraphic trap. Sand accumulations of the Valendis became clayey in the direction of the crest of the structure. From a depth of about 2,850 ft. the discovery well, 8 Dueste, yielded 220-250 bbl. of crude per day through a 1/6-in. choke.

South of Aldorf, Rehden gas field will take up regular production as soon as the 40-mile pipeline from Rehden to a steel works at Osnabrueck is completed. Under a contract made by Wintershall AG. and Georgsmarienhuette, Osnabrueck 9-10 million cubic feet of natural gas per day is to be piped from Rehden to Osnabrueck.

In June, a promising oil find—also of the stratigraphic-trap type—was made by Deutsche Erdoel AG. on behalf of the consortship Deutsche Erdoel AG.-Preussag-Vacuum near Bramstedt in Holstein. The wildcat, 3a Bramstedt, encountered an oil-impregnated sandstone of the Dogger gamma at a depth of 6,500 ft. Production tests resulted

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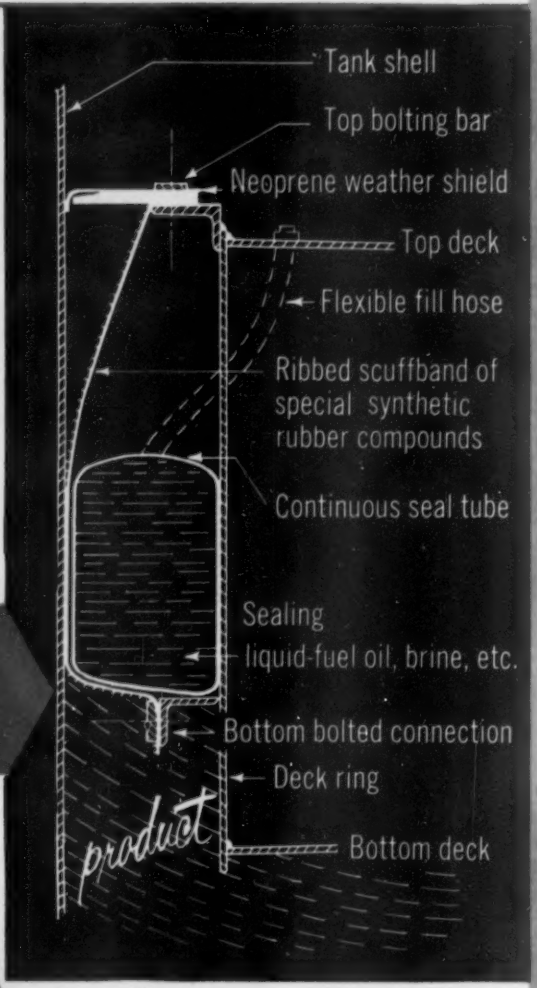

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in an initial flow of 300 bbl. of light crude (specific gravity 0.851) through ⅛-in. choke. The discovery well is situated on the western border of the big Jurassic trough north of Hamburg on the northwestern edge of which the prolific oil fields of Boostedt and Ploen have been developed since 1952. Here the Dogger sandstone is out-thinning, capped by a Cretaceous transgression. In the meantime a second well has begun producing in Bramstedt field.

The Bramstedt find again confirms a hypothesis which has recently also been stressed by Dr. Bentz, president of the German Geological Survey. In northwestern Germany, promising prospects for the search for oil are found along the edges of the deep Jurassic troughs, which must be systematically exploited.

At the beginning of 1954 the German Geological Survey estimated the crude-oil reserves of the country at a total of 400 million barrels of which 300 million barrels are proved and 100 million barrels probable.

Refinery Expansion Nearly Completed

The refinery-expansion program of the West German industry has been nearly completed during 1954. Some major new plants went on stream.

After reparation of the damage caused by the fire which had broken out when the Houdry cracking tower was moved in, the newly erected T.C.C. plant of Gewerkschaft Erdoel-Raffinerie Emsland at Lingen - Holthausen began operation. On an intake of 11,000 bbl. per day from nearby Emsland oil fields, the Lingen plant turns out approximately 48 per cent gasoline, 14 per cent diesel oil, 7 per cent liquefied petroleum gas, 11 per cent petroleum coke, 6 per cent fuel gas, 6 per cent fuel oil, and 7 per cent coke residue. The intake capacity can be stepped up to 13,000 bbl. crude per day. To the Houdry cat cracker of the Lingen refinery a polymerization plant (California Research Corp. design) has been added.

After completion of a new catalytic cracking plant at Hamburg-Harburg, the refinery of Esso AG. (Standard of Jersey) has the largest crude intake capacity (40,000 bbl. per day) within the Federal Republic of Germany. The new plant uses Aramco crude, while in the old part of the refinery Tia Juana crude from Venezuela is still processed to yield bitumen mainly.

Last fall the BP Benzin und Petroleum G.m.b.H., affiliate of Anglo-Iranian Oil Co., on its site at Hamburg-Finkenwerder, put on stream the first Platformer on the European Continent. This unit has an intake capacity of 5,000 bbl. of heavy naphtha per day.

GERMAN CRUDE-OIL PRODUCTION
(In barrels)

	1952	1953	Jan.-Oct. 1954
Holstein	945,102	1,333,373	1,496,034
Hanover	5,785,613	6,554,983	5,763,766
Weser-Ems	308,623	1,188,767	1,827,490
Emsland	5,378,165	6,205,890	6,052,920
Upper Rhine Valley	45,958	256,779	394,022
Bavaria	92	92	1,725
	12,463,553	15,539,884	15,535,957

At the same time a new bitumen plant was completed at Finkenwerder to process 1,000 bbl. of bitumen daily. The total crude-intake capacity of the BP refinery has now reached 28,000 bbl. daily.

Shortly after the Platformer of BP had been put on stream, another Platforming plant was completed at the hydrogenation works of Gelsenberg Benzin AG. at Gelsenkirchen-Horst. It has an intake capacity of 8,000 bbl. of heavy naphtha per day. In addition to this Platformer, the Gelsenberg works now comprise a catalytic T.C.C. cracker, a catalytic polymerization plant (California Research Corp.) and its old plant for catalytic hydrogenation. The distillation units which in part are used as a secondary capacity combined with the hydrogenation process and are therefore not wholly available for crude-oil charge, have a total intake capacity of 60,000 bbl. daily.

After a contract has been concluded between Ruhrchemie AG. of Oberhausen-Holten and Gulf Oil Corp. arranging for the delivery of crude oil, construction of a cracking plant, which had temporarily been stopped, is now being continued. Ruhrchemie AG. has decided in favor of a cat cracker of the Socony-Vacuum Oil Co. method. After its completion, Ruhrchemie expects to be able to process 6,000 bbl. of crude daily during the first few years.

While the larger works have continued to enlarge their throughput capacity, some smaller plants were forced, as a result of unprofitability, temporarily to stop operations. This happened in the case of Ruhrbau GmbH. of Muelheim, Kraftstoff - Handelsgesellschaft mbH. of Altenessen, and Albert Sengewald of Dedenhausen. Ruhrbau GmbH. which has in the meantime passed into the hands of Farbenfabriken Bayer AG. (formerly IG. Farben), will probably resume operations at a later date. Possibly it is intended to treat crude oil and then use part of the residue oils for petrochemical production.

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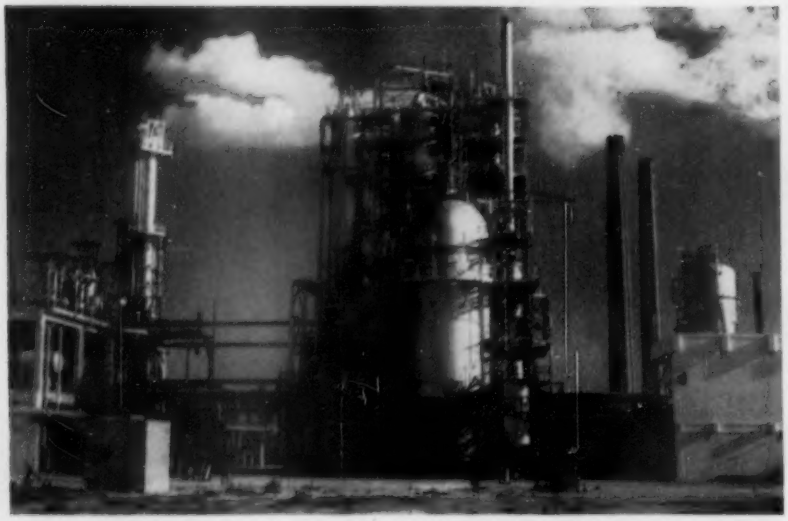

CAT CRACKERS, like this Shell unit at Berre-L'Etang, have sprung up in many parts of France in the past few years to satisfy the demand for higher motor-fuel octane numbers and greater product diversification.

Capacity, Cat Cracking Increase As France Modernizes Refineries

- Throughout capacity of French refineries is now 545,000 bbl. per day as compared to 167,300 bbl. per day in 1938. France is now self-sufficient in all petroleum products except aviation gasoline. Some reserve capacity exists.
- Crude-oil supply is largely of Middle East origin but more French crude will be supplied since Parentis field was discovered.
- As in other countries, octane number of motor gasoline has been increasing. The trend toward more catalytic cracking units continues. One catalytic reforming unit is now coming on stream.

by J. Andrault

BEFORE the war, France held first place among the petroleum refining industries of Europe. But during the war years refining capacity fell to 1.5 million tons per year (30,600 bbl. per day).

With the end of hostilities, the industry speedily recovered. The Marshall plan accorded France a high place in the European refinery program, and within the framework of the Monet plan an ambitious scheme of modernization was begun.

During the first 5 or 6 years after the war, the industry concentrated on restoring existing installations and constructing new distillation units to increase capacity and meet the most urgent needs of the country. Since 1950, French refineries have turned their attention to plant modernization so they could compete with the best products available in world markets. Extensive installations of the latest equipment for solvent refining of lubricating oils were constructed. Catalytic cracking plants and catalytic reformers were introduced to meet the progressive increase in the octane number of motor gasoline and to permit more flexibility in products obtainable.

Author is chief engineer with S.G.H.P. (Societe Generale des Huiles de Petrole), Paris.

TABLE 1—DEVELOPMENT OF CRUDE-DISTILLATION CAPACITY

	Throughput cap.	
At end of year:	Million metric tons/year	Bbl./ day
1938	8.2	167,300
1945	1.5	30,600
1948	8.0	163,500
1950	16.75	342,000
1951	22.22	454,000
1952	24.52	500,000
1953	25.43	520,000
1954	26.76	545,000

Throughput Capacity

Table 1 shows the remarkable development of the French petroleum industry since the end of the war.

Present capacity is enough to cover home market requirements as well as those of North Africa. And there is reserve capacity which can be used, according to circumstances, either for the export market or for processing petroleum for outside interests.

The total throughput capacity is spread between a small number of refineries which, except for Pechelbronn, are erected on or near the coast. These can be grouped as follows (Table 2):

Crude-Oil Supply

French refineries receive their crude-oil supply mostly from the Middle East. The proportion of crude obtained in French territory has been negligible until lately, but is now becoming more prominent since the Parentis field was discovered. Table 3 shows the percentage by weight of the total crude coming to French refineries from different countries during the first quarter of 1954.

TABLE 3—PERCENTAGE OF CRUDE OIL FROM DIFFERENT COUNTRIES PROCESSED IN FRENCH REFINERIES

	Per cent
Middle East	93
U.S.A.	0.35
South America	4.35
Miscellaneous	0.22
National crude	2.08

Development of the Refining Industry

After the end of hostilities, the refining industry concentrated on the production of fuel oil to compensate in part for the extreme shortage of power then prevailing. Fuel-oil requirements were relatively much higher than the demand for gasoline and it was necessary to develop distillation capacity. In consequence, a certain number of cracking units were converted into distillation units.

From 1949 to 1952, French refineries gradually increased distillation capacity by commissioning large, modern units. At the same time they extended their range of products and turned particularly to the production of high-quality lubricating oil.

Solvent extraction . . . Four large refineries were equipped during this period with modern solvent extraction units. Their total production capacity

was 475,000 tons per year (9,100 bbl. per day), which represents about 70 per cent of total lubricating capacity in France.

Since 1952 the French refining industry has had two problems to face: (a) the progressive increase in gasoline octane number, and (b) increasing the flexibility of manufacturing processes so that seasonal variations of fuel oil and gasoline consumption could be more easily met.

It should be recalled that in France the octane number of gasoline (regular and premium grades) is determined by French authorities. The government sets specifications of all petroleum products sold in the country.

The octane rise . . . Table 4 shows the successive minimum official octane number of gasoline distributed in France.

TABLE 4—OCTANE NUMBER OF MOTOR GASOLINE DISTRIBUTED IN FRANCE

	Regular		Premium	
Date	Motor method	Research method	Motor method	Research method
1949	68			
1950	70		75	
1951	70	73		80
1952	70	73		80
1953 (Sept.)	70	73		87
1954 (March)		75		
1954 (August)		77		
1955		77		90

Since the thermal cracking and thermal reforming processes were no longer capable of producing gasoline meeting these new requirements under satisfactory conditions, catalytic cracking and catalytic reforming units began to be placed in operation. The first cat cracker was commissioned in 1952. Today there are five of these units in operation, three of which are F.C.C. units and two of T.C.C. type.

Cat capacity . . . The total capacity of these large units is 2,850,000 tons per year (58,200 bbl. per day), i.e., over two-thirds of the combined capacity of thermal cracking and thermal reforming units and about 10 per cent of the crude distillation capacity. To this should be added a reforming catalytic unit (Platforming) capacity of 225,000 tons per year (5,000 bbl. per day) which is just being commissioned. Table 5 compares thermal and catalytic capacities since 1950. Although capacity of the thermal units has not increased essentially since 1953 and tends to fall with their increasing age and obsolescence, catalytic cracking units, on the contrary, show a remarkable increase.

TABLE 6—REFINERY PRODUCTION, 1953

Products—	Thou. tons
Propane and butane	333.1
Spirits	5,085.7
White spirit	41.4
Kerosine and jet fuel	552.6
Gas oil	3,104.9
Fuel oils	10,651.7
Bitumen	848.9
Lubricants	393.2
Wax	15.8
Miscellaneous	85.0
Total	21,112.3

TABLE 2—FRENCH REFINERIES

Refinery and name of company—	Throughput capacity— Tons/year	Bbl./day
NORTH ZONE:		
Dunkerque—S.G.H.P. BP	2,000,000	40,700
BASSE-SEINE ZONE:		
Gonfreville—C.F.R.	3,600,000	73,200
N. D. Gravenchon—Socony	850,000	17,300
Petit Couronne—Shell	2,100,000	42,700
Port Jerome—Esso-Standard	4,200,000	85,600
ATLANTIC ZONE:		
Donges—Raffinerie Francaise de Petrole de l'Atlantique	1,600,000	32,700
Ambes—R.P.G.	1,000,000	20,400
Pauillac—Shell	700,000	14,300
MEDITERRANEAN ZONE:		
Berre—Shell/Berre	3,800,000	77,400
Frontignan—Socony	1,250,000	25,500
La Mede—C.F.R.	3,250,000	66,200
Lavera—S.G.H.P. BP	2,200,000	44,700
EAST ZONE:		
Merkwiller—Pechelbronn	210,000	4,300
Total	26,760,000	545,000

TABLE 5—CRACKING AND REFORMING CAPACITY

	Capacity, tons/year			
End of the year:	Thermal cracking	Thermal reforming	Catalytic cracking	Catalytic reforming
1950	2,400,000	550,000		
1951	2,850,000	295,000	750,000	
1952	3,090,000	585,000	720,000	
1953	3,160,000	925,000	2,055,000	
1954	3,320,000	925,000	2,845,000	225,000

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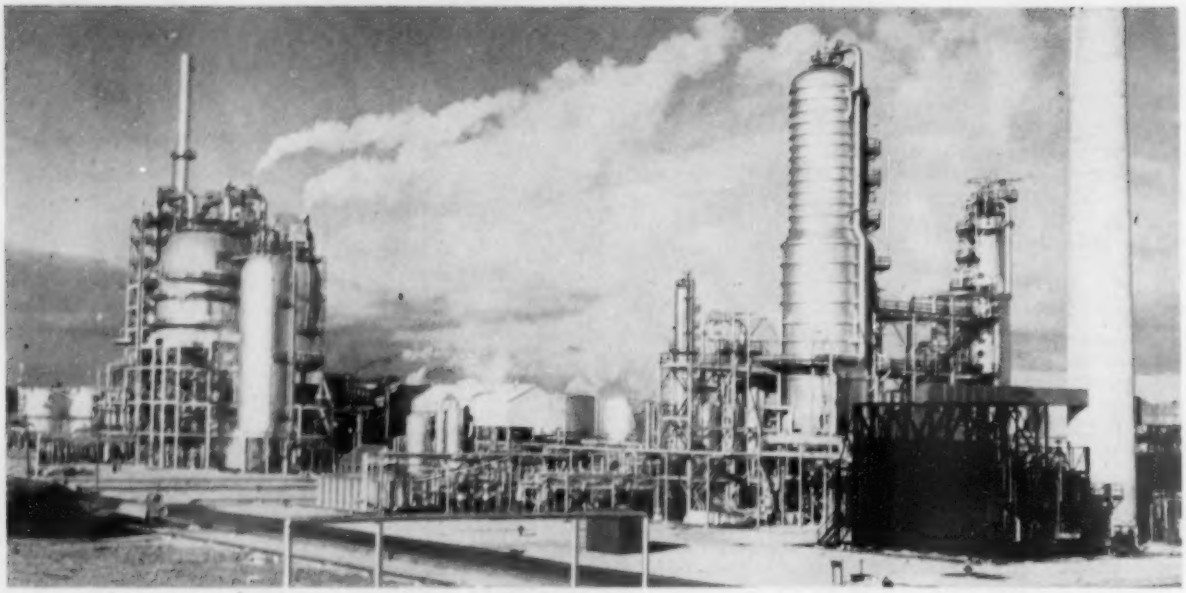

CATALYTIC CRACKING UNIT and two-stage crude unit of the Esso refinery at Fawley, England. Heat exchangers are shown in center foreground with the pipe-still furnace at extreme right.

V-E DAY—0 BBL. PER DAY
1954—280,000 BBL. PER DAY . . . THAT'S THE STORY OF

Esso Refining in Western Europe

Here's how one company attacked a challenging rebuilding-expansion program

by V. S. Swaminathan

WESTERN Europe has enormous concentrations of industry and industrial skills, high living standards, and great need of energy sources, especially oil. Prewar, all of Europe excluding U.S.S.R. consumed only 800,000 bbl. per day; in 1950 western Europe alone accounted for nearly 1,300,000 bbl. per day. Producing a trickle of oil itself this important region had always imported the bulk of its products from the United States and the Caribbean area. A much smaller proportion of its oil came across the Atlantic as feed stock for the few small refineries in Britain, and on the continent.

When World War II ended, most of the European refineries were gutted ruins following bombing by both belligerents. Bulk installations and terminals were destroyed, storage tanks collapsed, tankers were sunk at sea, and tank barges went down at their loading docks. Railroad tank cars were blasted to bits. The bottleneck retarding resumption and expansion of the flow of oil to the region was the acute dollar shortage.

With Marshall aid, and the timely help of the international petroleum companies, Europe's oil men went to work. In this task of rehabilitation and new construction, the affiliates of Standard Oil Co. (New Jersey) played a noteworthy part. Prewar, Jersey's 10 refineries in Europe turned out finished products at 60,000 bbl. per day. On V-E day they couldn't refine a single barrel of crude. Yet, output was raised to 55 per cent of prewar level in 1946, and 103 per cent in 1948.

Only 2 years later Esso's European refinery throughput rose to 166 per cent of prewar, or 100,000 bbl. per day of finished products. By the end of 1953 the company's refining capacity in seven of the free countries—Britain, France, Italy, Germany, and the three Benelux nations—reached approximately 280,000 bbl. per day or 466 per cent of the prewar level. In five others—Denmark, Norway, Sweden, Finland, and Switzerland—Jersey's affiliates will be importing part of their needs as finished products from abroad.

Jersey oil men found that 7 out of their 10 refineries had been devastated by the war; that four-fifths of their refining capacity was gone. Worse still, old staffs of skilled employes had dispersed and even disappeared. Among Esso's wrecked refineries were Port Jerome and La Mailleraye in France, Ebano in Germany, Vallo in Norway, San Sabba in Trieste, Fornovo in Italy, Teleajen in Romania.

On V-E day it had but three installations still intact in this region—Fawley on Southampton Water in England; Atlas, a small topping plant at Antwerp in Belgium; and a minor asphalt unit at Kalundborg in Denmark. All these were shut down for lack of crude-oil supplies.

Jersey technicians had thus three compelling tasks ahead of them—(1) survey of war-torn facilities to ascertain exactly how much of the equipment could be used; (2) resume flow of crude to the three refineries still intact; and (3) rebuilding wrecked refineries without undue delay. As a result of their patient, persevering, and energetic efforts the damaged refineries began

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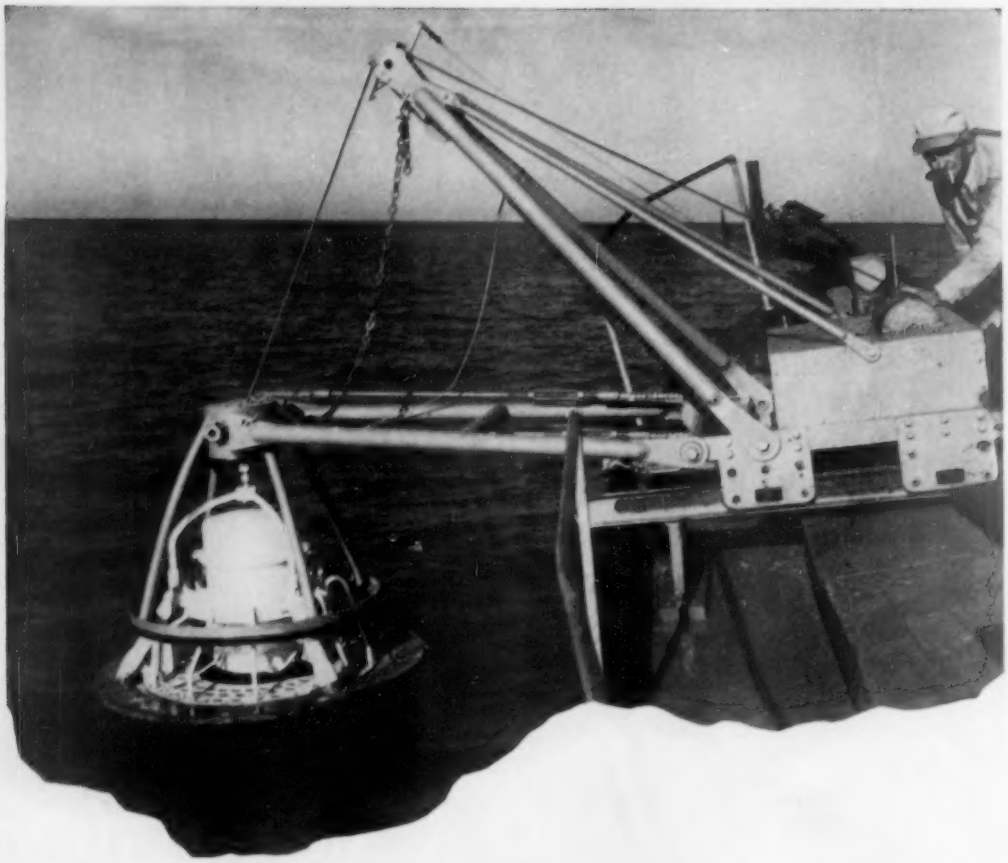

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rising one by one from their ashes. As rapidly as was practicable new equipment replaced improvised machinery, and the flow of refined products grew steadily larger.

By 1950 all the damaged refineries in Europe had been restored to production, and additional ones acquired at Leghorn and Bari in Italy. By then more than four-fifths of the total crude required by the Esso European refineries was imported from the Middle East oil fields for which western Europe is the logical outlet.

Fawley Plant Is England's Largest

Turning to individual installations, the Esso refinery at Fawley in England is the largest in Britain, with an annual throughput of 6,500,000 long tons of Middle East crude oil purchased largely for sterling. Site clearing on this job started in July 1949, and within 2 years' time the refinery was on stream, thus partly offsetting the loss occasioned by the shutdown of the Persian Abadan refinery in July 1951. Capital outlay on its construction, totaling $105,000,000, was found by the parent company, Jersey Standard.

Major units at Fawley comprise two pipe stills for crude distillation, a fluid cat cracker, polymerization plant, Edeleanu and other treating plants, a hydrodesulfurization unit for tractor fuel, sulfur-recovery unit, and lube-oil plant. Materials used in erecting the refinery included: steel, 120,000 tons; steel, cast iron, and concrete pipes, 400 miles; electrical and telephone wire, 2,000 miles; concrete, 140,000 cu. yd.; and 14,000 valves and 300 pumps. At the peak period of construction 5,500 men were employed, while for full operation there is a permanent staff of 2,700.

In addition to meeting all the company's requirements in the British Isles there is a substantial volume of refined products available for export; part of these are shipped to Denmark. In comparison with importing a similar quantity of finished petroleum products the Fawley refinery is saving over $100,000,000 a year. For processing and cooling it utilizes over 4,323,000 gal. of water per hour. The marine terminal, with its 3,200-ft.-long jetty and four berths, is able to accommodate simultaneously four of the largest ocean-going tankers afloat, as well as several coastal vessels.

Low-octane fractions from the distillation process are reformed under high temperature and pressure into a high-octane motor spirit and a quantity of gas. Liquid propane and liquid butane are extracted from this gas by compression and fractionation. Gases from the cat cracker are compressed and fractionated to yield a very light gas fraction forming the feed stock for the polymerization plant. By combining the molecules of light gases from the cracking process and fractionating the resulting product, more light gas is obtained as refinery fuel; a middle fraction of butane is taken off, stored under pressure, and blended back into motor fuel to give it the desired volatility; and a bottom-fraction polymer, a high-octane component of premium-grade motor spirit, is obtained.

The lube-oil installation consists of four units for the treatment of fractions from the vacuum distillation tower: the propane deasphalting plant for washing the lube oil and removing asphalt, the propane dewaxing unit for the removal of wax by crystallizing and filtering; the phenol-extraction plant to remove compounds with poor lubricating properties, and the clay-contacting unit for improving the color and imparting a green fluorescence to the finished product.

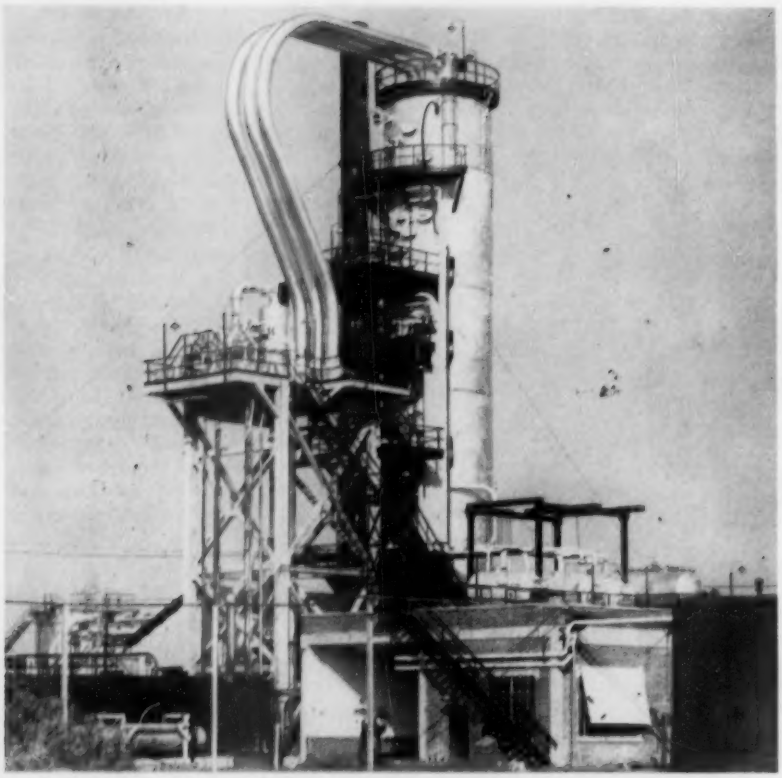
In the oxidizing plant air is blown through the bitumen obtained from the vacuum tower to produce in it the rubbery consistency specified for special applications such as roof felting. Another unit accounts for additives for lube oil to reduce corrosion and sludge formation.

The hydrodesulfurization installation reduces the sulfur content of tractor fuel. This is achieved by passing the latter mixed with hydrogen over a catalyst bed. The resulting hydrogen sulfide stream is thence fed into the sulfur plant, which produces annually 12,000 long tons of practically pure rock sulfur from the hydrogen sulfide released during certain of the refinery operations.

The maintenance structure covers an area of over 3 acres, half of which is devoted to workshops and the rest to stores. The administration building, 600 ft. long, houses the main offices of the refinery. It has 110 rooms, and provides accommodation for 300 employes. At one end of the structure is the medical wing which is a complete small-scale hospital with consulting rooms, X-ray and physiotherapy equipment, and surgery and medical laboratory.

Fawley has in hand plans for expansion costing at least $28,000,000 in the next few years. It would be the first refinery in Britain to have a Hydroformer unit, entailing an outlay of nearly $11,000,000, scheduled to go on stream in 1956. It reforms crude-oil fractions in the presence of a catalyst and in an atmosphere of hydrogen to give a very high-quality gasoline. This extra supply will mean that less of the middle distillates, including jet fuel and diesel oil, for which there is a growing demand, will have to be used as feed stock for petrol production by prevailing processes.

MARINE TERMINAL of the Esso refinery at Fawley, England, as it neared completion. With a length of 3,200 ft., this is one of the longest oil docks in the world.



LUBE-OIL RERUN STILL of the Port Jerome refinery in France. Current output of this plant is approximately 4 million metric tons per year.

France's Port Jerome Refinery

In France the Port Jerome refinery was commissioned in 1934. Its prewar throughput was 1,210,000 metric tons a year (24,700 bbl. per day). By 1950, despite war damage, this total was stepped to 1,900,000 tons per annum (38,800 bbl. per day). This increase of 60 per cent over prewar was obtained with essentially the same crude-distillation equipment consisting of two double-stage pipe stills, with only one cracking coil out of three prewar units, a minor part of the gas-plant facilities, and limited tankage. The boiler plant removed by the Germans had to be entirely rebuilt.

Speciality crudes (Venezuelan and Webster) are run for the manufacture of lube oils and asphalts, representing 24 per cent of crude run, the remainder being from Middle East (Aramco, Kuwait, Iraq) making motor gasoline, kerosine, diesel oil, domestic, light, and heavy fuels.

The program of expansion and modernization included:

1. A complete propane dewaxing 1,200 plant (1,200 bbl. per day) and propane deasphalting plant of 1,800 bbl. per day of Standard Oil Development Co. design which started operating in early 1952. Addition of these facilities to the phenol treater tower started up in June 1949, a lube rerun unit recovered from Austria, and clay-treating plant permitted the manufacture of a complete line of all lube oils from Middle East distillates. Low-cold-test oils and distillates for the manufacture of transformer and white technical oils at the speciality oil plant at La Mailleraye, are made from Venezuelan and Webster crudes. The total output of finished lubes has been raised to 160,000 tons per year (3,070 bbl. per day).

2. A fluid cat cracker, with attendant gas-plant facilities, has been completed. These, in conjunction with the existing reformer coil, permit meeting the needs for motor gasoline, as well as other products by running approximately the same amount of crude as in 1949, for maximum yields of motor gasoline and distillates and a minimum of heavy fuel.

Other outstanding developments at Port Jerome have embraced: (1) The doubling of the capacity of the crude-oil pipe line from Le Havre to the refinery by the laying of a new section of 10-in. pipe over a distance of 17 miles, with three new multistage centrifugal electric-motor-driven pumps at the pumping station. This stepped up the capacity of the system to 75,000 bbl. per day to take care of the present and future needs of the Port Jerome refinery. This line also serves the Gravenchon refinery of Socony-Vacuum. (2) Two new boilers of 50 tons per hour capacity, 650 psi. pressures have been erected in a new type of layout by which building construction was reduced to a minimum. A third boiler was added late in 1950. (3) Complete facilities for the manufacture of solvent naphthas, together with chemical treating of these, and other white products were made available. In addition, the existing laboratory buildings were expanded and a new semiindustrial laboratory erected, as well as a motor laboratory with 12 separate cells for motor testing.

In summary, the Port Jerome refinery's current annual throughput is of the order of 4 million metric tons, and the installation comprises three distillation units (two of prewar vintage and one new unit rated at 25,000 bbl. per day), two reformers, a cat cracker, a liquefied gas plant, one oil and grease plant from which naphthenic oils and kerosines of high viscosity index are obtained, a gasoline-treating plant, and an asphalt unit.

Antwerp's 25,000-Bbl. Plant

The Esso Antwerp refinery, erected at an outlay of $25,000,000, with a daily throughput of 25,000 bbl., accounts for a full line of major petroleum products. Its two outstanding features are the introduction of the relatively new combination unit, and the incorporation of a Model IV fluid cat cracker. Processing Middle East crude, primarily for the production of motor fuel, kerosine, diesel fuels, and light and heavy fuel oils, this plant was engineered by Standard Oil Development Co., and constructed by Lummus Co.

This Belgian refinery incorporates the most modern design of "combination unit" operations, employing a maximum of process integration. Basic processes integrated are crude distillation, thermal reforming, Model IV cat cracker, SO_2 extraction, and the combined sweetening unit. In place of separate processing steps the combination units embrace all three phases of distillation, cat cracking, and reform-

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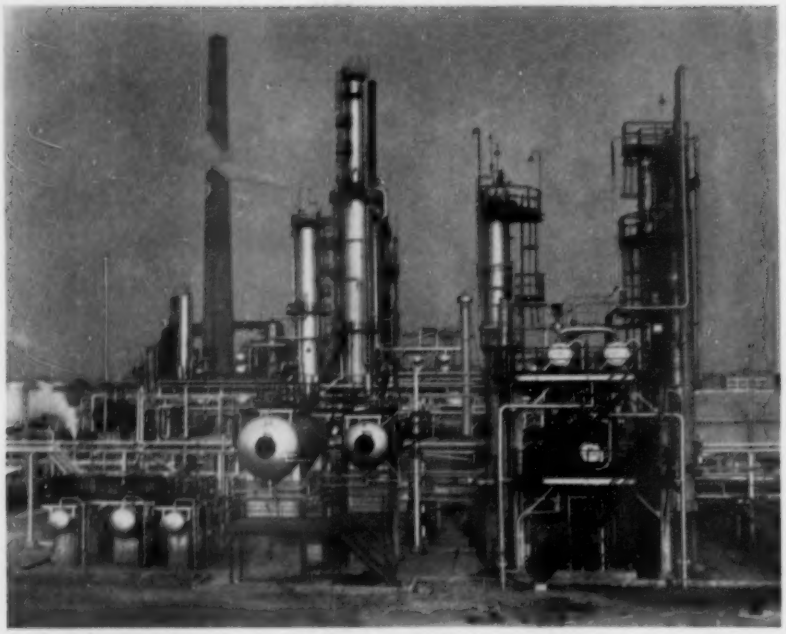


TREATING UNIT of Esso's Antwerp refinery, which has a daily throughput of 25,000 bbl. and manufactures a full line of major petroleum products.

ing. This means fewer tanks, less steel, and shorter pipelines, resulting in a saving also in the cost of offsite equipment. Centrally controlled operation is feasible as well.

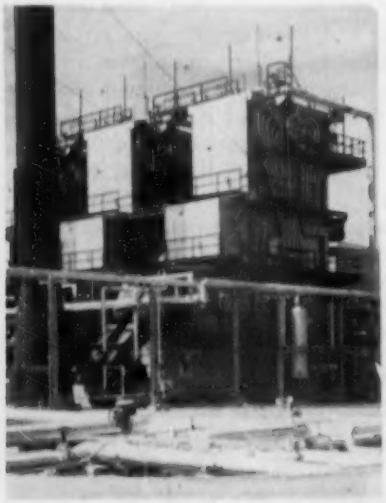
In this unit crude flows to the pipe still where four cuts are taken—light naphtha overhead, heavy naphtha or kerosine distillate, gas oil, and bottoms. The light naphtha is stabilized and sent to doctor sweetening. Part of the heavy naphtha goes to the finishing operations for the production of power kerosine, but the bulk of this cut serves as feed for the thermal reforming furnaces. Products from the latter are fractionated, the major item being high-octane thermal reformed gasoline, which is stabilized and then doctor-treated.

When a kerosine distillate is made it is processed through the SO_2 extraction unit for the production of illuminating kerosine. The third cut from the pipe still (gas oil) serves primarily for the production of automotive diesel oils, although some of this stream is employed as fluxing stock for fuel oils. A fraction may also be utilized as feed for the cat cracker. The bottoms is fractionated to procure cat cracking feed, and a heavy bottoms is employed either as feed to the asphalt plant, or as a heavy-fuel component.

The Model IV cat cracker is smaller in size, easier to operate, and lower in cost than its predecessors. These improvements render it eminently suitable for refining operations outside the United States. Fresh feed for the reactor is obtained from several sources, the most important being the bottoms from the crude pipe still. The catalytically cracked products are fractionated into gasoline, distillate, and fuel-oil components, as well as for recycling. The remaining processes in the refinery follow the standard pattern.

There are provisions at this refinery for minimizing air and water pollution. Electricity for operating the plant is purchased from the city of Antwerp, and is supplied at 15,500 volts to the main substation. Steam requirements are met by three 30,000-lb. per hour boilers operating at a nominal pressure of 150 psig. and 450° F. temperature at the superheater outlet. Feed water is taken from the treated-water storage tank through the blowdown feed-water exchanger and the deaerating heater to the boilers.

The refinery has a total of 45 oil and 2 water tanks. Refined products are shipped by barge, tank truck, and tank car. Marine facilities include two tanker unloading berths on the Hansadock and three barge loading berths on the oil basin. All docking facilities are rented from the city of Antwerp. One of the tanker berths handles fuel oil and marine diesel bunkers, and the second, reception of crude oil. Two four-point tank racks are located in the marketing area at the extreme northwest corner of the refinery site. In sum, the Esso Antwerp refinery is admirably adapted to the company's marketing organization in the Benelux area.



BOILERS at the Esso Antwerp refinery.

Stanic Starts Up Leghorn Plant

The new Stanic refinery at Leghorn in Italy was inaugurated late last April. Stanic is an Italo-American corporation, set up in 1949 by Jersey Standard and Azienda Nazionale Idrogenazione in equal partnership to take over, rebuild, and reorganize the Leghorn and Bari installations built by the Italian Government before World War II. Jersey's Stanic undertaking formed the first major postwar foreign investment in Italy.

Much of the wartime damage to the Leghorn plant was repaired and partial rebuilding started in 1947, and by the following year both topping and cracking units were brought into operation. The modernization and expansion program has raised throughput to approximately 1,600,000 metric tons a year (32,000 bbl. per day) at a capital cost of 16,000 million lire ($25,600,000). The Leghorn refinery occupies an area of about 1 million square meters (250 acres), of which the buildings erected cover one-tenth. Crude oil is discharged at the oil dock and conveyed by a 20-in. line to tanks of 22,000 cu. meters (140,000 bbl.) capacity in the Paludetta zone in the western sector of the refinery.

The Leghorn installation, equipped with a 1,700 metric ton per day (12,400 bbl.) atmospheric distillation plant, a 3,300 ton per day (24,000 bbl.) two-stage unit; and with reforming and

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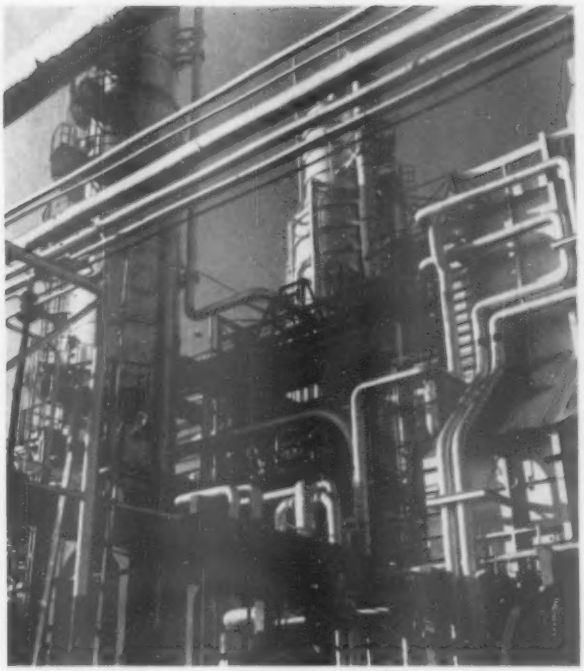


MODERNIZATION AND EXPANSION of the Stanic refinery at Leghorn, Italy, has raised throughput to 32,000 bbl. per day.

NEW CATALYTIC CRACKING UNIT which was put on stream at the Esso Hamburg-Harburg refinery in western Germany in the spring of 1954.

stabilization units, is capable of processing 520 tons per day (4,400 bbl.) of gasoline. A special feature of this refinery is the most modern lube-oil production equipment consisting of: (1) phenol and Duo-Sol solvent extraction plants, each with a capacity of 250-300 tons per day (1,750-2,100 bbl.); (2) dewaxing unit of 200 tons per day (1,500-1,600 bbl.); (3) acid treatment for 130-250 tons per day (900-1,750 bbl.); (4) paraffin wax plant including a Dorr-Oliver wax filter, the largest in operation in the country; and (5) filling equipment and packaging plant.

Enlargement of ancillary services and kindred facilities embraced five tubular steam boilers with a capacity of 125 tons per hour of steam at 450° C. and 38 atms.; two electric turbogenerators each accounting for 3,500 kw.; in addition to which the refinery uses 1,200 kw. supplied by the Soc. Elettrica Selt-Valdarno; five compressors, three giving 750 cu. m. per hour at 7 atms.; nine tanks for crude oil with a storage capacity of 240,000 cu. m. Plans have been made for the construction of a 1,000 tons per day (approx. 8,000 bbl.) fluid Hydroformer, whereby 93-95 octane benzene will be produced against 79-81 grade from thermal reforming.

Work executed at the Bari refinery was essentially in the nature of removing bottlenecks, since the plant was relatively undamaged during the war. The old hydrogenation facilities have been sold, and the current crude charge of the installation is approximately 30,000 bbl. per day.

Germany's Largest, Most Modern

In the outer fringes of Hamburg in western Germany, Ebano, a small prewar asphalt plant, had been transformed into a fully fledged general installation and its capacity considerably expanded. It is now the largest and most modern refinery in the country with an annual throughput of 13,400,000 bbl.

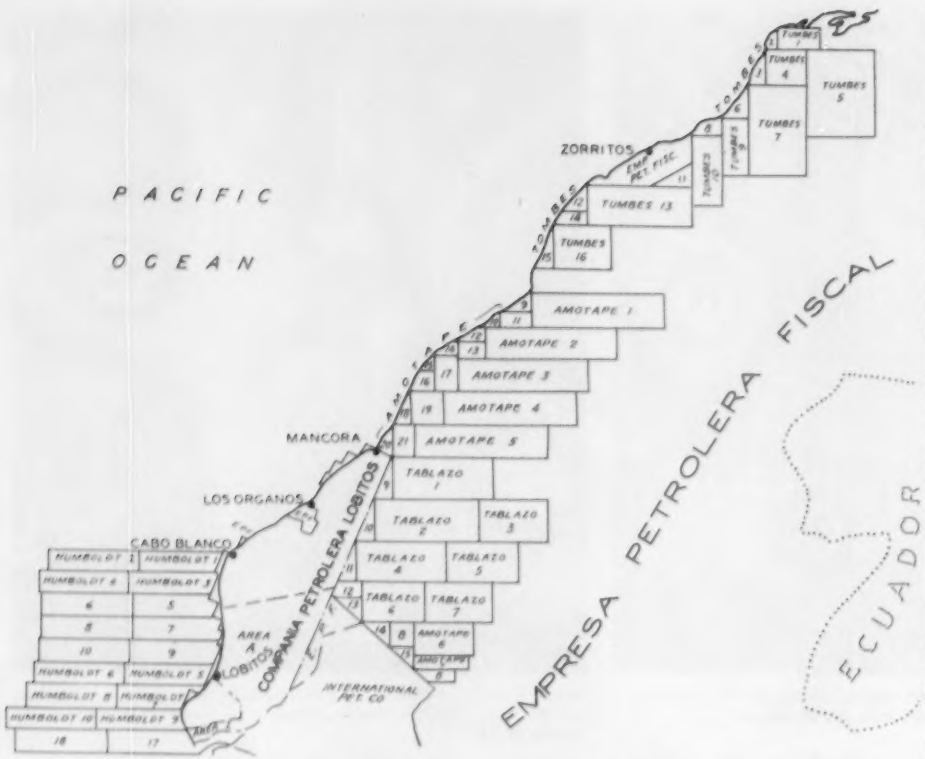
In the first decade following its erection in 1928-29 the Ebano plant was one of the foremost suppliers of bitumen in Europe. Toward the end of the war approximately four-fifths of the installation with an annual processing capacity of 5,000,000 lb. was destroyed.

Esso's comprehensive rehabilitation and expansion program called for the following new structures on the former Moorburg meadows acquired by the company several years previously: a second still, a cracking unit for processing topping residues for gasoline and fuel oils, a reformer for improving low-octane gasolines, a new tank farm for storing crude and finished products, and a Model IV fluid cat cracker. The commissioning of the refinery in early 1954 represented the culmination of 4 years of planning and concentrated effort. During the rehabilitation and enlargement phase the company placed orders worth $16,700,000 a year to the Federal Railways. In short the Esso Hamburg-Harburg refinery stands as a monument to the smoothly meshed teamwork among many groups—a product of German skill and industry.

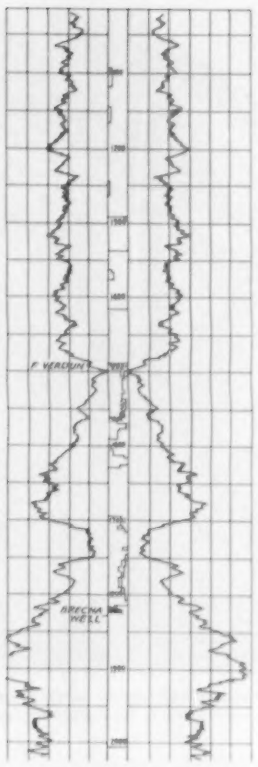
Materials in Construction

To render the foundation sufficiently strong to bear the weight of the heavy equipment an area of 2,470,470 sq. yd., forming part of the site, was hydraulically filled up to a height of 15 ft. with 52 million cubic foot of sand and 105,900 cu. ft. of silt. Materials used in construction included: iron and steel, 11,270 tons; plain and reinforced concrete, 441,975 cu. ft.; masonry 92,840 cu. ft. (including a smoke stack 90 m. high); and reinforced brickwork, 15,900 cu. ft.

Crude oil is brought to Harburg in tankers from both the Middle East and Venezuela. Basic cuts obtained by distillation are converted into lube oils, gasolines, white spirits, and bitumen. Through the cat cracking process in the Model IV unit, a replica of that at Esso Antwerp refinery in Belgium, gasoline, light and heavy fuel oil, cracked and liquefied petroleum gases are produced.



Map of the new concessions in the northern part of Peru's coastal area.



Log of PB 90, first commercial well in the area.

Peru Pushes Search for New Reserves

Here's an appraisal of prospects in northern part of country's coastal area

by Dr. J. E. Rassmuss

PERU'S oil area on the northern coast is composed of three sections: (1) the producing fields of International Petroleum Co., Compania Petrolera Lobitos' fields, and Organos field of Empresa Petrolera Fiscal, all located between the Chira River in the south and Quebrada Mancora to the north; (2) the Sechura Desert in the south; and (3) the northern coastal area from Qu. Mancora to Tumbes and the Ecuadorian frontier in the north. The small Zorritos field is located in the northern area; it has yielded a cumulative production of around 3.8 million barrels, but is almost completely depleted.

Production . . . The producing fields have yielded, through 1953, a cumulative output of 449 million barrels of crude, of which the major share of 357 million barrels is credited to International; Lobitos' fields have yielded about 86 million barrels, and Organos, discovered in 1943, a total of 1.8 million barrels. In addition, about 28 million barrels of condensate has been recovered in these fields.

In the first half of 1954, Peru's production, which in the former year had declined slightly, increased 9 per cent to 8,573,195 bbl.

Regarding the future outlook, production of International's field, which has been produced for 50 years and is nearly depleted, is maintained by excellent recovery methods at around 30,000 bbl. per day; Lobitos' fields output of about 15,000 bbl. per day is steadily rising, having increased about 20 per cent in the first half of 1954; and Empresa's Organos fields' output, after a sharp rise, has been stabilized at around 50,000 bbl. monthly.

As domestic demand increases yearly about 10 per cent, amounting in the present year to around 34,000 bbl. per day and estimated for 1955 at 39,000 bbl. per day, development of new resources is indispensable for Peru's economy and for maintaining its position as an oil-exporting country.

Exploration . . . Exploration in the Sechura Desert, where the concessions of 10 companies cover around 4.1 million acres, has not met with success so far. Thirteen wildcats have been drilled, all of which were dry and struck basement in depths to 8,000 ft. In the producing area, only Lobitos' concessions enclose probable undiscovered reserves. It is therefore interesting to consider the oil possibilities of the northern section of the coastal area.

The Northern Coastal Area

Stratigraphy . . . Thickness of the Tertiary sedimentary sequence in the northern area is estimated, according to the surveys of Empresa Petrolera Fiscal, at about 12,000 ft. The width of the Tertiary belt reaches 12-13 miles. On its eastern border Paleozoic schists and quartzites are outcropping, in which

Author is consulting geologist, Lima, Peru.

Pennsylvanian fossils have been found in the Amotape Mountains. They are mostly metamorphosed by the intrusion of younger granites. On the Tertiary shelf of this Paleozoic ridge the Tertiary beds have been deposited.

To the east of the Paleozoic belt, Cretaceous deposits outcrop in a wide belt to the western Ecuadorian frontier and advance in the south by the transversal Pananga fault to the west in the region of El Muerto. The uppermost member, the Malpaso shales of Danian age, are overlain north of the Pananga fault unconformably by basal conglomerates of the Salinas formation of the lower Eocene. The underlying, strongly bituminous Muerto limestones, are considered as a possible source bed of oil, but have not yet been encountered in the Tertiary oil region.

Only the Malpaso shales have yielded some production in Brea-Parinas field and have been found to the north in the Collonitas area in a well of International Petroleum Co., reaching 2,800 ft. in thickness, but not yielding commercial oil.

The Tertiary deposits, composed of alternating shales, sandstones, and basal conglomerates, comprise in the northern area between Qu. Mancora and Qu. Culebras the Eocene and Oligocene sequence. Several unconformities divide the section. Sedimentary thickness increases from the eastern border to the coast, as equally observed in the southern area and Sechura. The Eocene deposits diminish in thickness from the south to the north, thinning out in the Zorritos region, where the Oligocene-Mancora sandstones lie directly on granite in the wells RT 50 and RT 52 of E.P.F. at 1,671 and 1,402 m. depth, respectively.

The Eocene section is composed of the Salinas formation of lower Eocene age, Talara of middle Eocene, and Verdun and Chira of upper Eocene age. In the lower Eocene only the Salinas formation is developed. On the eastern border, the Salinas, overlying the Paleozoic rocks disconformably, reaches only 300-600 ft. thickness, but increases to the west on the coast, reaching in the region of Punta Sal a thickness of more than 5,000 ft. The Salinas formation is built up in this region by an alternation of gray and variegated shales with fine-grained sands and contains conglomerates on the eastern border.

The Salinas sands provide a substantial part of the production in Brea-Parinas field and the contemporaneous "deep sands" in Lobitos fields hold an important reserve. In Organos field and in the wildcats of Peruvian Pacific Petroleum Co., located east of El Alto and Organos field, they have so far proved dry or contained water.

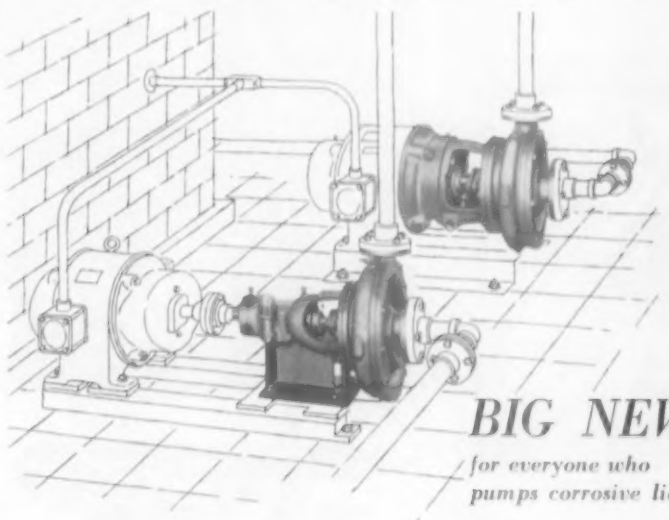
The Parinas sandstone, which is the most prolific horizon in the Brea-Parinas and southern Lobitos fields, and the overlying Chacra shales seem to extend only to Qu. Mancora and are not developed in the northern area, principally because of lack of deposition, and in part perhaps because of erosion before deposition of the overlying transgressive Talara formation.

The Talara formation of middle Eocene age is separated by a significant unconformity. While in Brea-Parinas field it provides only a small percentage of the output, its thickness and importance increase to the north and it yields an important share of the output in El Alto field and the entire production in Organos field, where its thickness increases to 4,700 ft.

The Northern Area

The Talara formation is widely exposed in the northern area and the lower sands have carried oil shows in several wildcats. The Cabo Blanco sandstone below has been prolific in Alto field and the correponding Nuro of E.P.F. has lately given encouraging results in Organos. The Talara formation comprises one of the principal prospects of the northern area.

Overlying a new transgressive uncon-



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formity, the upper Eocene Verdun sandstones follow with a basal conglomerate. In Qu. Pilar in the Cancas region the basal conglomerates cut the uplifted Talara sandstones and shales in angular disconformity and contain numerous boulders of granite, indicating the regional extent of the transgression. Thickness of the Verdun sandstones varies from about 600 to 1,000 ft.

In Brea-Parinas field, the Verdun sandstones yield a substantial percentage of the output and in the northern area the wildcat PB 90 produced 30 bbl. per day, and wells PB 90 and PB 54 drilled a section of 180 ft. of oil sands. The Verdun presents, therefore, one of the most immediate prospects of the northern area.

The Verdun is overlain conformably by the brownish Chira shales, which are shallow-water deposits, containing plant remains and lignite. Intercalations of bentonitic beds are characteristic for this group and gypsum is frequent. In the upper part, intercalations of sandstone and fine-grained sands occur. In the northwestern part of the area this formation has disappeared, due to subsequent erosion during the Oligocene transgression, but to the south and southeast its thickness increases to about 1,000 ft. or more. It constitutes the cap rock for the oil-bearing Verdun sandstones.

The transgressive Oligocene-Mancora sandstones coming from the north cut sharply the underlying formations; in the north in Zorritos, they rest directly on the granite basement.

The Mancora formation of lower Oligocene age is principally composed of light sandstones and conglomerates, which because of their hardness form topographical elevations. Variegated, often brightly colored shales are intercalated. In Zorritos wells RT 50 and 52, its thickness reaches 3,000 ft., overlying the granite, but diminishes gradually to the southwest to only about 1,000 ft.

Water under high pressure, gas and oil shows have been encountered in a wildcat north of Mancora, but oil prospects should be considered poor and could be expected only in secondary deposits.

The Mancora is conformably overlain by the dark Heath shales of upper Oligocene age, which reach 3,000 ft. in thickness. In the middle part, sandstones and conglomeratic beds are intercalated. The Heath shales have been considered as a possible source bed and seepages occur in Qu. Hervideros south of Zorritos, but no proof of commercial oil has been found so far. The oil of the overlying Miocene sandstones of Zorritos field is of secondary origin and probably migrated from Eocene deposits, buried in the ocean, which continue in the Ecuadorian fields of Santa Elena Peninsula to the north.

Zorritos Field Formations

In Zorritos field the Oligocene-Heath shales are covered by the Miocene Zorritos sandstones, divided by variegated clays in a lower and upper group. Stratigraphically corresponding conglomerates outcrop in the south in the Punta Bravo region and in Carpitas, reaching considerable thickness.

From Zorritos to the north continuously younger Tertiary deposits are exposed. The Zorritos sandstones are covered by the Cardalitos clays of about 1,200-ft. thickness, which are overlain in turn by a group of sandstones, called Tumbes, of upper Miocene age. These are exposed largely on the coast of Zorritos near Tumbes. Pliocene deposits with marine fossils reaching 300 ft. in thickness are exposed in the lower area north of Tumbes.

Finally, remnants of Quaternary raised seafloors, covered by sands, conglomerates, and shell breccias, occupy a wide area in the so-called Mancora Tablazo south of Qu. Mancora. These are uplifted to 1,000 ft. above sea level, and are preserved in the northern area on the hills in the interior and in the Punta Bravo and Qu. Seca region on the coast. The shoreline is actually receding in Zorritos, where recent

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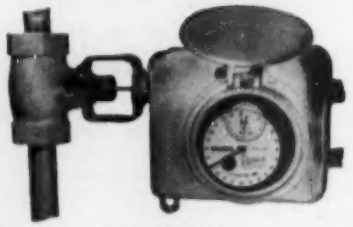

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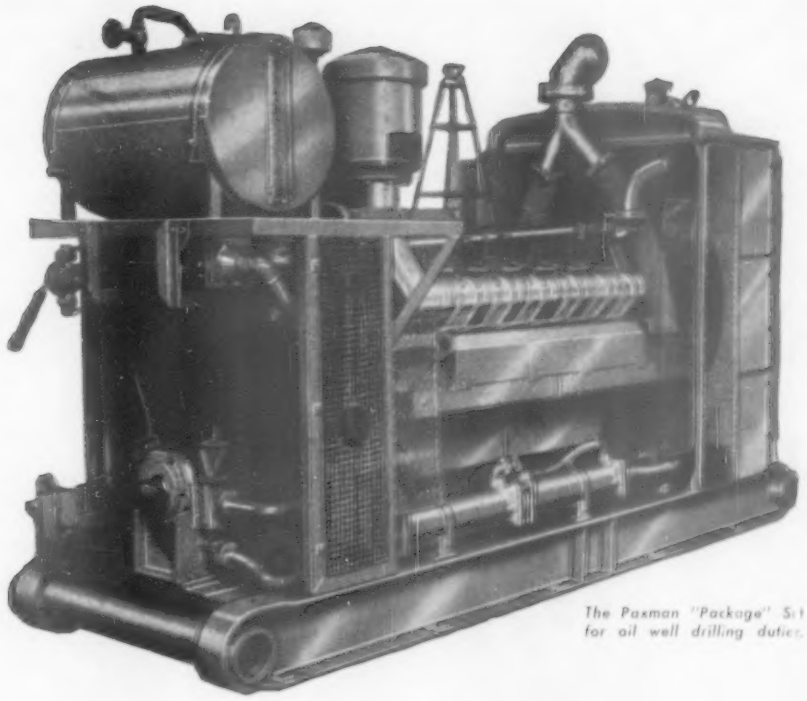

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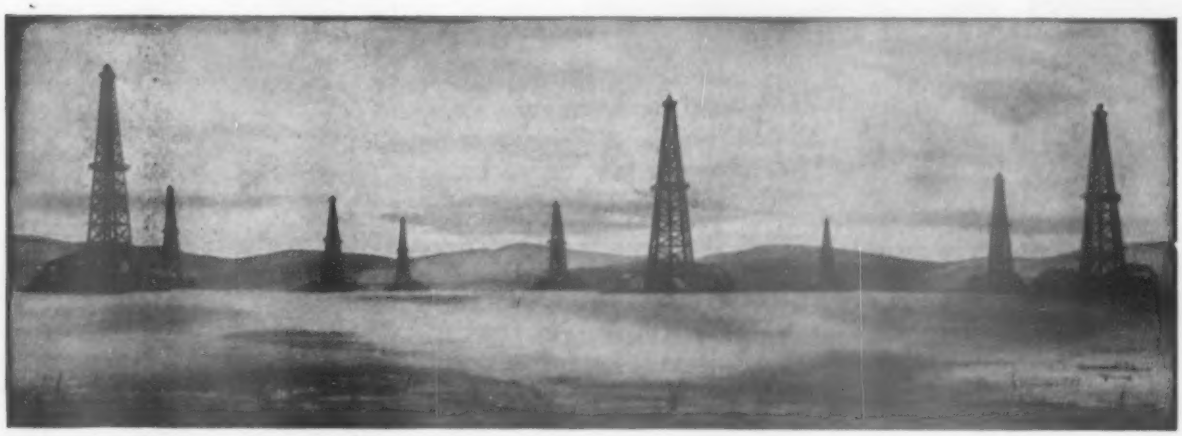

changes have been observed since 1939.

Structural outline . . . Trend of the structure lines in the northern area is southwest-northeast, parallel to the Andes uplift and also roughly corresponding to the coast line. Two principal uplifts can be traced in this direction. In the interior the Carrizal uplift, in which the oldest Tertiary, the Salinas, outcrops, is parallel to the uplift of the Paleozoic ridge and can be considered as a lower part of it. Near the coast the second high, the Plateritos-Cancas-Carpitas uplift, shows Talara in its axis. Both are separated by the Mancora syncline, in which the Oligocene-Mancora sandstones and the overlying Heath shales are widely exposed.

The uplifted structures are separated by faults, accompanied by numerous secondary faults and divided further by transverse faults into a number of different blocks. Faulting in the area near the coast is more intense, due to the tension of the downward trend of the Pacific graben, and the principal structure is divided into many smaller blocks, shattered by numerous faults. Thrust of the major faults reaches, according to E.P.F. geologists, 1,600 to 1,700 ft.

Regarding the eastern uplift, oil seepages occur farther south at La Breita, south of Qu. Mancora and Fernandez on a fault near the Paleozoic border, and Lobitos Co. drilled a well about 25 years ago on this secondary uplift; it struck basement at 762 ft. Prospects of the eastern area must be considered poor because of the reduced thickness of the Tertiary deposits. The favorable prospects of the structure in the coastal belt will be discussed later in more detail.

Drilling . . . Only a small number of exploration wells have been drilled in the northern area. International Petroleum Co. drilled two wells about 25 years ago east of Punta Sal.

The first well, located on an uplifted block of Talara and drilled to 2,320 ft., found oil shows at 820 and 1,635 ft., but only water below that.

The second well, 1 km. to the east on the same structure, found oil shows at 2,050 ft., but water at 2,200 ft. and was abandoned.

Farther north, east of Plateritos, the well Punta Mero 1, spudded in the Talara formation, was dry to a depth of 2,022 ft. and found only water.

A national company drilled three wells in the same period in the region of Cancas, in the Leases 13 and 17 of Amotape Co., the first one to more than 3,000 ft. No detailed logs are known, but in the Cancas 2 of only about 1,200 ft. depth a strong emanation of gas together with water was observed, which probably was not shut off properly.

Serious exploration drilling, combined with electrical logging, gamma rays, and micropaleontological tests has been carried out in recent years by E.P.F. On the anticlinal uplift of Punta Bravo in lease 19 of Amotape Co. four wells were drilled in 1940-41.

The most important pool has been found in Carpitas on the Santos Martinez structure, located in lease 19 of Amotape Co.

Future Planning

Compania Petrolera Amotape, an independent American company, has leased from Empresa Petrolera Fiscal the total coastal area between the mouth of Qu. Mancora in the south and Qu. Culebras in the north, in addition to the eastern part of the Collonitas area in the south—a total of 69,557 hectares or round 170,000 acres. The company by its operating company Amo Oil Co., Inc., proposes to drill first five wells in Carpitas pool for developing this area and increase by sand fracturing, because of the tight sands, the yield of the already drilled wells.

Peruvian Pacific Petroleum Co., a subsidiary of Cities Service Co. and Richfield Oil Co., has entered a similar contract with E.P.F. for the Tumbes area, located to the north, surrounding the old Zorritos field, where mostly

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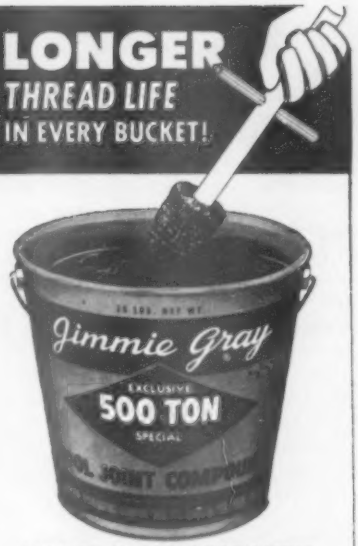

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Oligocene and Miocene deposits are exposed.

Peruvian Pacific has also leased the southern adjoining part of E.P.F.'s concession area, located to the south of Amotape Co.'s concessions, and east of the Lobitos concessions and the El Alto and Organos fields, comprising also the western part of the Collonitas area north of International's boundary. Peruvian Pacific has drilled three wildcats in this interior eastern area.

Prospects

Regarding the oil prospects of the northern coastal area several favorable features have been explained in the foregoing description. The Salinas formation, which is oil-bearing in the producing fields, reaches considerable thickness of 3,000-5,000 ft. in the belt near the coast. Oil shows have been found in several wells, and oil seepages exist on the eastern border of the deposits in La Breita. The Talara formation contains commercial deposits in the nearby fields of El Alto and Organos. Oil shows have been found in the wells of Punta Bravo. The Verdun sands, covered by the Chira shales, offer an excellent reservoir rock and have produced in the wells PB 2, PB 6, and PB 40 and yield commercial oil in PB 90. Secondary deposits may be encountered in the Oligocene-Mancora sandstones, covered by the Heath shales.

Favorable structures for oil accumulation are found in the uplifted and tilted blocks, in which the oil is found in Brea-Parinas. Such structures are present in the Santos Martinez block, where commercial oil has been proved near the Carpitas fault.

Other indications have been encountered in the Punta Bravo structure and the Cancas anticline also offers interesting prospects. Here, strong gas blows were found in the shallow well.

Favorable structures may be proved also farther north in the Plateritos area, as the structural highs may enclose areas of earlier uplifts in former cycles, subject to erosion by subsequent transgressions.

Outlook for the northernmost Zorritos area, covered by the Tumbes concessions of another company, appears less favorable because of the absence of the Eocene oil-bearing sequence and possibly reduced sedimentary thickness in large areas, and accumulation of only younger deposits.

Finally, as an interesting prospect in the northern region, there is the Collonitas area in the south. The Collonitas uplift constitutes the northernmost structure in International's Brea-Parinas concession. Well 4585 of International, brought in recently, has yielded about 400 bbl. per day from the Salinas.

Empresa Petrolera Fiscal discovered a new pool, called Sector Peru, near the boundary of I.P.C., located near the mouth of Q. Faiquillal into Qu. Merino, in which three producing wells have been brought in so far. Production of Sector Peru in the first 9 months of 1954 amounted to 24,820 bbl., reaching a high in June of 4,534 bbl. This area, in the form of a wedge, enclosed between the Lobitos and International concessions, has remained reserved for E.P.F. The adjoining western part of the Collonitas area has been leased to Peruvian Pacific Co.; the eastern part is leased to Amotape Co.

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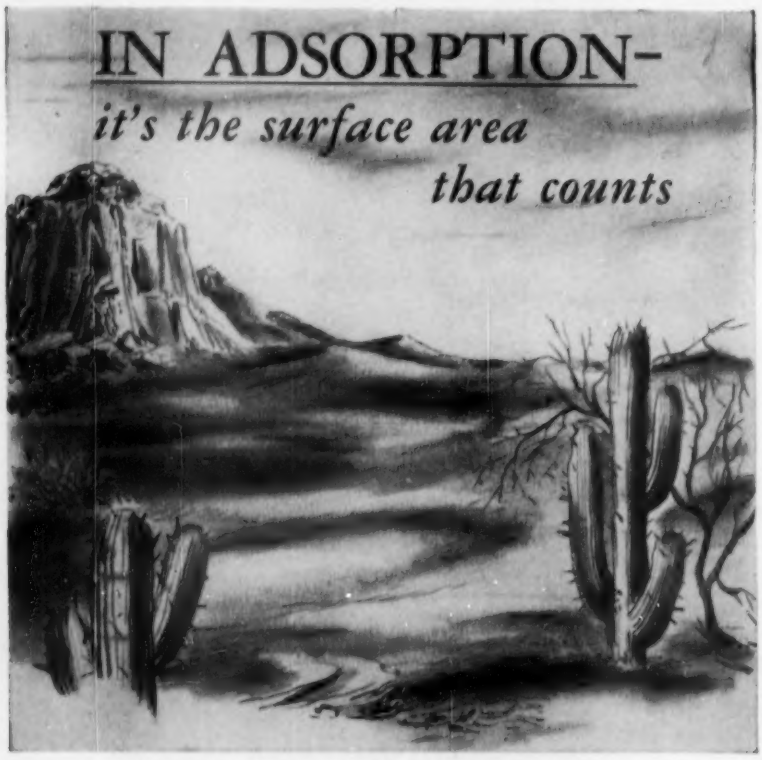

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Florex is particularly superior in the adsorptive refining, decolorization, clarification and neutralization of mineral, vegetable, and animal oils, fats and waxes and for processes involving the use of highly active clay for sweetening light distillates, dehydrations, desulfurization, and polymerization.

Available in all standard particle sizes, special Florex meshes may also be ordered.

Floridin maintains a modern laboratory with highly specialized equipment for the proper evaluation of your adsorption problems. Technical data, samples, quotations, and the services of staff technicians are available upon request.

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B&W Seamless and Welded Carbon, Alloy and Stainless Tubing for Condensers and Heat Exchangers

CARBON STEEL

This grade is used where service conditions are mild, that is, where the temperatures involved are relatively low and corrosive attack is not anticipated.

LOW CHROMIUM STEELS

The addition of chromium and molybdenum give these alloys good strength at elevated temperatures and improved resistance to oxidation as well as resistance to deterioration in services involving some hot corrosive gases.

INTERMEDIATE CHROMIUM STEELS

These grades have applications similar to those of the low chromium group except the additional alloying elements improve their characteristics and permit higher operating temperatures. They are particularly adapted to the handling of oils or hydrocarbon fluids containing sulphur compounds.

NICKEL STEELS

These steels are particularly suited for handling neutral salt solutions such as sodium and potassium nitrate or sulphate. They have found service in the black liquor evaporators of soda and kraft paper mills. Another field of application has been in sub-zero temperature service where high impact resistance is also a necessity.

STAINLESS STEELS

These steels are for specialized application where service conditions are extreme, that is, where corrosive environments or high temperatures are problems. The stainless steels have wide usage in the chemical industries, petroleum refinery, paper making, drug preparation, food processing and dairy and beverage industries.

For sound assistance in meeting your specific tubing requirements, write for Bulletin TB-329A or, better yet, get in touch with Mr. Tubes, your link to B&W. He represents B&W's headquarters technical staff and strategically located district offices, and B&W's nationwide network of fine tubing distributors.

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THE BABCOCK & WILCOX COMPANY
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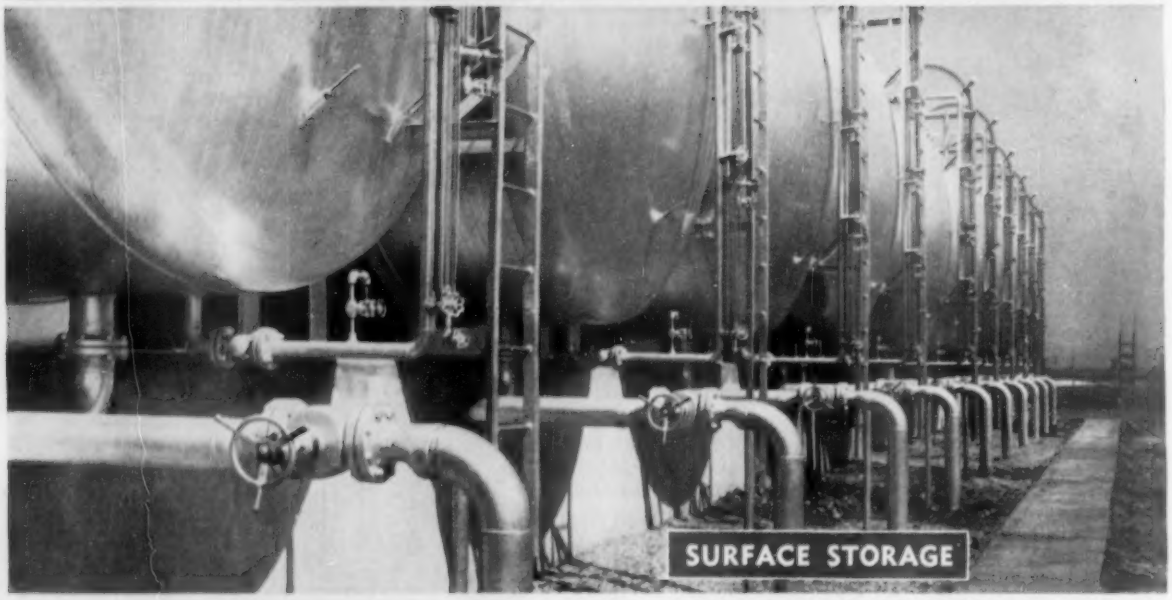

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Stop product loss and product contamination by using **ORBIT FORGED STEEL ASA CLASS VALVES** in your plants, storage and loading facilities. You can reduce maintenance cost too, because **ORBIT FORGED STEEL VALVES** do not require a lubricant to effect a shut off. ORBIT'S friction free seating means longer service and fewer repair bills.

They are rising stem type and are so designed to require a minimum of turns to open or close. There is no guessing—a quick glance tells you if they are open or closed. There are no voids or cavities in the body of an **ORBIT ASA CLASS VALVE** to trap fluids. When the valve is closed it drains clean to either side of the line.

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REFINING

Short Cut to Ethanol

Shell engineers describe direct synthesis from gas

NEW YORK. — Ethylene is being hydrated directly to ethanol instead of proceeding through ester formations employing sulfuric acid. This is done in a new catalytic process for synthesizing ethyl alcohol from natural gas.

The process, in use since 1948, was discussed publicly for the first time at the recent meeting of the American Institute of Chemical Engineers by C. R. Nelson and M. L. Courter of Shell Development Co., Emeryville, Calif.

The method eliminates many problems involved in the use of sulfuric acid required in the acid absorption process. Acid consumption, reconstitution facilities and corrosion costs are bypassed.

Two plants are in commercial operation using the Shell hydration process. The first was built by Shell Chemical Co. at Houston in 1948. A second unit was installed at Grangemouth, Scotland, by British Petroleum Chemicals, Ltd. which is licensing the process from Shell. Both have operated successfully since they were built.

The process consists of combining ethylene and water in the vapor phase over a phosphoric acid-on-Celite catalyst to form ethyl alcohol. Three reactions take place. C_2H_4 combines with H_2O to form C_2H_5OH in the primary reaction. The principal side reaction is the dehydration of ethyl alcohol to form diethyl ether: 2 C_2H_5OH becoming $(C_2H_5)_2O$ plus H_2O. Another byproduct of the reaction is formed from acetylene, present as an impurity in the feed stream: C_2H_2 plus H_2O yielding CH_3-CHO or acetaldehyde. In addition the authors said, a small amount of ethylene polymerizes to form less than 1 per cent of a wide range of olefinic polymers.

In a purification process, the acetaldehyde is hydrogenated over a nickel catalyst and converted to ethyl alcohol.

Platformer in Operation

MUSKEGON, Mich.—Naph-Sol Refining Co. has placed a 1,000-bbl. per day Platformer on stream at its refinery here.

The unit is designed to make 95 leaded octane Platformate from a charge stock of naphtha which is derived mainly from West Texas crudes. The Platformate is being blended with other materials to produce a finished gasoline which Naph-Sol markets under the brand name of "Zephyr" in the Muskegon and Green Bay, Wis., areas.

Aluminum Growth Boosts Demand for Petroleum Coke

NEW YORK.—The fast-growing aluminum industry is providing a steadily rising market for petroleum coke, and by next year the Nation's refiners will supply more than 1 million tons of coke to aid in the electrolytic recovery of the metal.

The Aluminum Association has estimated that over 2,900,000,000 lb. of primary aluminum will be produced this year. The figure for this year tops last year's production by 16 per cent, and next year's total is expected to exceed that of 1954 as one more plant will be added.

Consumption of petroleum coke is tied firmly to aluminum output since no practical substitute exists for the manufacture of electrodes employed in the electrolytic recovery of the light metal.

Approximately 65 lb. of petroleum coke is consumed in the production of every 100 lb. of primary aluminum.

ODM Certificates Granted

WASHINGTON.—International Petroleum & Chemical Exchange, Inc., of Lake Charles, La., has been granted a certificate of necessity for a proposed $9,580,000 alkylation plant for that city.

The Office of Defense Mobilization will allow accelerated amortization on 100 per cent of $6,700,000, 50 per cent of $2,755,000 and 35 per cent of $125,000. Another certificate was issued for expanded aviation alkylate facilities planned by Humble Oil & Refining Co. at Baytown, Tex. The full amount of the $236,500 project will be granted rapid amortization.

Phillips Petroleum Co. received a certificate covering $5,395,000 to be spent for new refining facilities at the 80,000-bbl. per day Borger, Tex., refinery. Great Southern Chemical Corp. received a certificate covering 65 per cent of a proposed $94,000 project at the Corpus Christi, Tex., plant.

Two natural gasoline plant expansions also received certificates. They cover $487,500 to be spent by Phillips in Upton County, Texas, and $70,000 worth of improvements to Cities Service Oil Co.'s Maysville, Okla., plant.

Everything to lubricate your plug valves *better* and *faster!*

Without obligation let us show you how to save ⅓ on your plug valve maintenance. Your valves will last longer, operate easier—and lubricate 10 to 15 times faster.

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The Delta High Pressure Gun and one-piece double-check fittings enable one operator to lubricate 10 to 15 valves in the time required to service 1 with jack screw. Delta fittings are available for ANY lubricated plug valve.

ONLY 4 DESCO LUBRICANTS HANDLE ALL VALVE SERVICES

No need to stock dozens of lubricants when only 4 Desco Lubricants do the entire job. Stays in your valves, keeps them easy to operate. Will not harden or coke-up, because no fillers or inert materials are used. Convenient gun size or jack-screw sticks or in bulk.

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FORCE FEED LUBRICATORS

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Petrochemicals

Chemical Sales Up

NEW YORK.—Chemical sales this year will aggregate $20 billion, according to a forecast by the Business and Defense Services Administration in its first issue of the new Chemical and Rubber Industry Report. This would represent an increase of roughly 1 per cent over 1953 sales, BDSA said.

While chemical sales lagged last year through the first two quarters, the upturn since August has more than offset the earlier decline. Much of the upturn may be attributed to new nitrogen plant completions. By mid-1955 the administration estimates that nitrogen capacity in the form of synthetic ammonia facilities will reach 3,125,000 tons. This compares with a capacity of 2,950,000 tons last September 1. The goal of 3,600,000 tons of nitrogen set for January 1, 1957 will in all probability be reached before that date in view of the announced building of synthetic ammonia plants throughout the country.

Rubber Molecule Synthesized

NEW YORK. — Goodrich - Gulf Chemicals, Inc., has completed the successful synthesis of the crude-rubber molecule; however, the discovery is not expected to have any immediate commercial application.

William S. Richardson, president of Goodrich-Gulf, said that the achievement was of great value technically even though the price of making the rubber appears relatively high at present.

Richardson also pointed out that the rubber could not be made in existing GR-S plants and would not affect the disposal of government-owned rubber facilities.

Although the company did not reveal the source of its materials, they are thought to have originated wholly or in part from petroleum fractions.

Ammonia Contract Signed

BREA, Calif.—An important marketing link in synthetic anhydrous ammonia production has been added by Brea Chemicals, Inc., a subsidiary of Union Oil Co. of California.

The company has contracted with the Amm-o-gro Division of Specialty Oil Products to handle promotion, sale, transportation and storage of anhydrous ammonia produced at Brea's plant here. The new $13,000,000 plant which can produce 235 tons of ammonia daily, went on stream in June.

5 REASONS WHY
LEASE after LEASE PUMPS with
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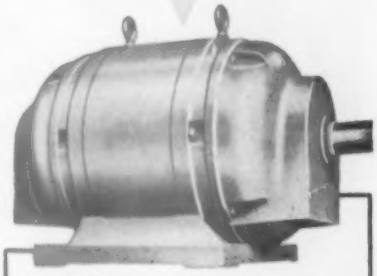
BALL BEARING
MOTORS



In the field you can depend on FIELDMASTER Ball Bearing Motors because they're specially built to meet the exacting demands of oil country use. Below are just five of the many outstanding advantages that make FIELDMASTER Ball Bearing Motors unsurpassed in their field!

1. Vermin Proof!
No matter how small, rodents and other animals can't get inside a FIELDMASTER Motor.

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Special splash proof construction prevents damage to the motor from liquids and flying particles.

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Motor windings are specially treated for outdoor service... conduit box is moisture proof and dust tight.

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Weather-protected FIELDMASTER Motors can be used in any kind of weather — rain, snow, sleet, blowing sand and dust.

5. Forced Air Cooled!
This exclusive fan-cooling system provides cooler operation over longer periods of time.

May we ask our distributor, BETHLEHEM SUPPLY COMPANY, to contact you?

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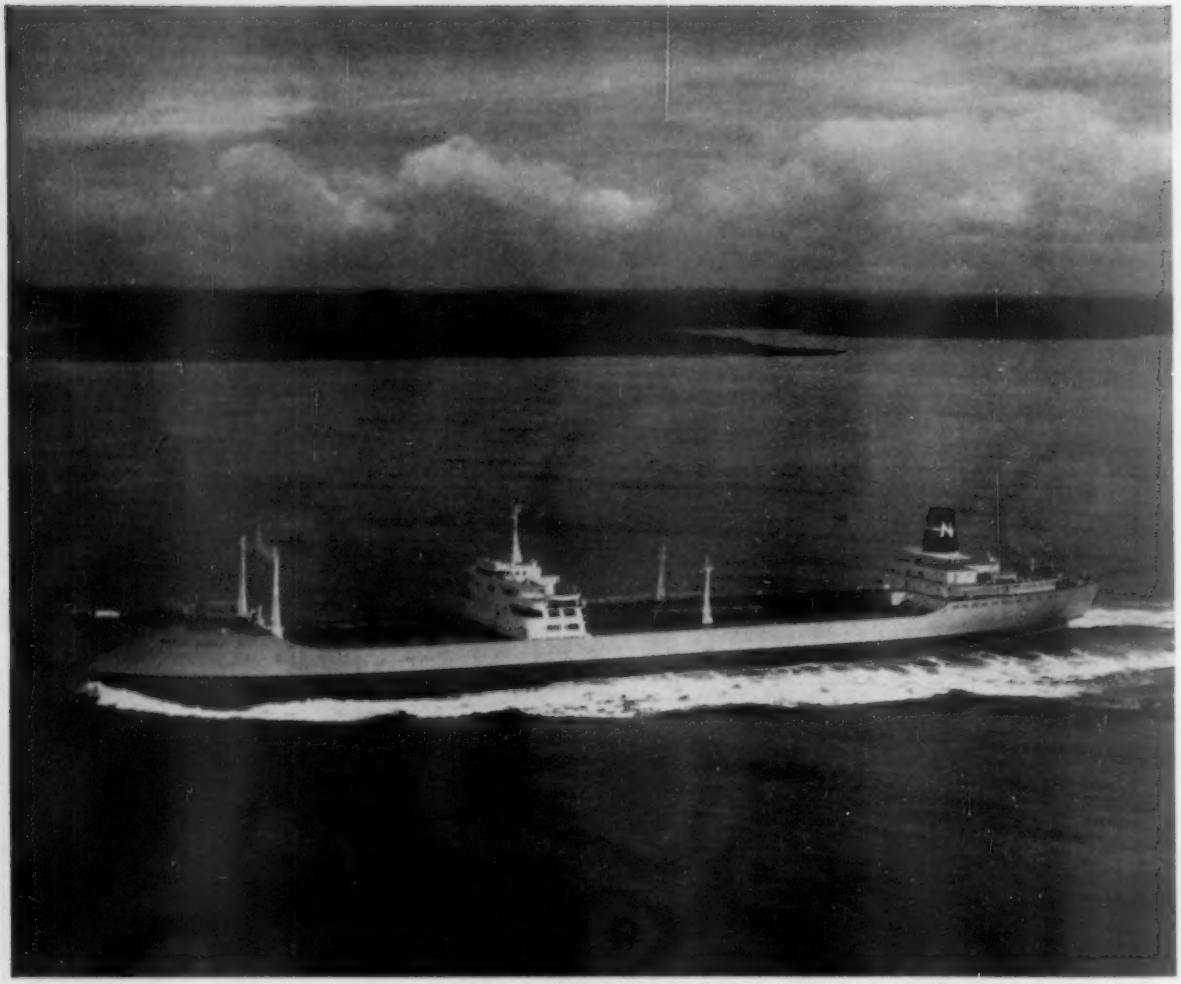

The *World Glory* on her sea trials

WORTHY OF HER NAME

The 45,500-ton *S.S. World Glory*, designed and constructed by Bethlehem for Stavros S. Niarchos, is the largest tanker ever built in the United States. But size is only one of her attributes. Incorporated into her design are a number of refinements that endow her with an unusual degree of operating efficiency and economy.

She revealed some of these qualities during her sea trials. Ballasted to service draft, the 736-ft tanker maintained speeds of better than 17 knots at her designed maximum of 15,000 shaft horsepower and of better than 16 knots at 12,000 shp.

Shipping men the world over will recognize this as a remarkable demonstration of speed in relation to horsepower and tonnage.

Many factors contributed to this outstanding performance. But chief among them was the vessel's improved hull form. Developed by Bethlehem, this form was designed to provide the tanker with maximum propulsive efficiency.

Truly, the *World Glory* is fully worthy of her name . . . and is another example of Bethlehem's contributions to shipbuilding progress over half a century of service to the maritime industry at home and abroad.

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Among the Drilling Contractors

Tulsa Drilling Companies In Operating Partnership

Frisbie & Yancey Drilling Co. and Creekmore Drilling Co., both of Tulsa, have announced the formation of a partnership arrangement whereby the companies join in the completion of all present drilling contracts of both companies, and, at the conclusion of these contracts, the acquisition of all drilling rigs Creekmore Drilling Co. has been operating in Oklahoma, Texas, and New Mexico.

In the partnership deal Frisbie & Yancey Drilling Co. will operate all rigs in the Mid-Continent and Permian basin areas. Creekmore Drilling Co. retains and will continue to operate its rigs in the Rocky Mountain region.

Novak Drilling Co., Tulsa, is contractor on a semi-wildcat test Arthur Finston, also of Tulsa, is starting in the Velma area, Stephens County, southern Oklahoma. The test is 1 Montgomery, in 8-1s-5w. Proposed depth is 3,700 ft.

Jordan Well Service Co., Kilgore, Tex., will drill a 3,800-ft. wildcat test east of Ore City, in Upshur County, East Texas, on a contract with Genzer Oil Co., of Oklahoma City. Location is for 1 Newsome, in the William Murray Survey.

Como Drilling Co. is contractor on a new Wilcox test by Justiss-Mears Oil Co. in West Locust Hill field, Adams County, southwestern Mississippi. Location is for 1-C U.S.A., in 6-5n-1w, west offset to the field's discovery well. Projected depth is 6,750 ft.

New Company to Drill

Mid-Oilfield Drilling Corp. is a newly formed contracting and operating organization, headquartering at Oak Park, Ill., and maintaining branch offices at Evansville, Ind., and field offices at Lawrenceville, Ill. E. Arthur Mueller is president; Rocco V. Pintozzi, vice president; Tom J. Agres, secretary; and Philip D. Caloger, treasurer. The company is starting with a 4,000-ft. rotary rig.

Glasscock Drilling Co., Shreveport, is drilling for Michel T. Halbouty, of Houston, at a new wildcat operation 3 miles northwest of East Lake Verret field, in Assumption Parish, coastal Louisiana. It is a 13,000-ft. test on State Lease 2206, in township 13s-13e.

Fortenberry Drilling Co., Natchez, Miss., has on schedule a wildcat test to be drilled for John S. Callon, also of Natchez, 2 miles southeast of Sunnyside field, in Jefferson County, Mississippi. The test is listed as 1 Truly, with location in 56-8n-1e. Hole will be carried to the Wilcox around 6,300 ft.

Sunnyland Contracting Co., Rayne, La., has contracted with Humble Oil & Refining Co. for another Wilcox test to be drilled in East Fairview field, Adams County, southwestern Missis-

W. E. Wicklzer (right), independent contractor and operator, Wakeeney, Kans., with some of his crewmen on a rig he is operating in Happy field, southern Graham County, western Kansas. Crewmen, left to right, are: Ray Wakefield, driller; Homer Corley, and E. G. Wood, helpers; and Lloyd Mefford, driller.

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For Economy and Hard Firing

- Completely burns all the fuel that passes through it.
- Makes a perfectly clear intense heat without smoke.
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- Makes it possible to secure 10% to 20% more horsepower from your boiler.

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sippi. Location is for 1 Zuccarro. It will be drilled directionally with hole to be deflected to a bottom location approximately 510 ft. southwest of the surface location. Projected depth is 7,300 ft.

Penrod Drilling Co., Shreveport, is scheduled for a 13,500-ft. wildcat test W. H. Hunt, of Dallas, is undertaking 1½ miles north of Napoleonville dome, in Assumption Parish, Louisiana Gulf Coast. Location, in 50-12s-14e, is for 1 Savoie.

Holmes Drilling Co., Long Beach, has a rig running for California Valley Oil Co. at a wildcat location in the Panorama Hills area, northwest of Fellows, in southwestern Kern County, California. Listing is for 51-S-28, in 28-31-21.

Rowan Drilling Co., Fort Worth, is drilling on a new Carter Oil Co. wildcat operation in the southwestern corner of Burke County, North Dakota. Location, 1 Torgerson, in 29-159n-94w, is northwest of Tioga production.

Howard P. Holmes Drilling Co., Hobbs, N. M., is drilling for Wayne Moore on a projected 6,000-ft. test, 1 Turner-McQuinn, in 8-18-39, 3 miles north of the East Hobbs area, eastern Lea County, New Mexico. Location is only 435 ft. from Texas' Gaines County line.

LaMance Drilling Co., Albuquerque, N. M., is undertaking a rank wildcat on its own account. It will be a 6,500-ft. Pennsylvanian test, 1 Simpson, in 21-10n-23e, 6 miles north of Cuervo, northeastern Guadalupe County, in the Santa Rosa basin area of New Mexico.

Como Drilling Co. has a new contract operation scheduled in the Flat Rock area, Franklin County, southern Mississippi. It is a Wilcox test to approximately 6,450 ft. for E. C. Wentworth, of Natchez, Miss. Designation is 2-C Cobb, spotted in 30-5n-1e.

F. E. Hargraves & Sons, Shreveport, will drill a 2,800-ft. Tokio wildcat test for Dell Cryer, also of Shreveport, at 1 Moore, in 7-21n-13w, 3¼ miles northwest of Alden Bridge, in Bossier Parish, northwestern Louisiana.

A **Zack Brooks Drilling Co.** rig is putting down Dick Quin's newly started Lower Cretaceous test 1¼ miles northeast of Bolton field, 12 miles west of Jackson, in Hinds County, Mississippi. Primary objective is the Paluxy producing zone encountered in the field below 9,900 ft. and expected in this test around 10,200 ft. The test is listed as 1 Board of Supervisors, in 16-6n-2w.

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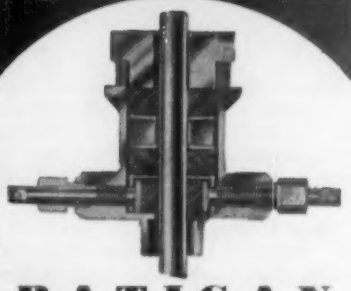
John R. Deaver (to you)



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Aerating Liquids

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TYPICAL APPLICATIONS

Chemical processing • Pharmaceuticals Water Softening (Zeolite & others) • Plating • Textile dyeing and finishing • Mixing and blending beverages • Tanning • Bleach manufacture • Paper industry • Electro chemicals...and other processes involving the handling of corrosive liquids or gases.

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Liquid Transfer
Heating
Circulating
Aerating
Agitating
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Pumping gases
Exhausting air or vapor against high vacuum

PROPERTIES

Corrosion resistance of any type of stainless is combined in a simple design of sound principle to provide extended service under corrosive conditions.

TYPICAL APPLICATIONS

Handling corrosive liquid or gas where color, taste or odor are important: Chemical Dairy • Food • Textile • Beverage Sterilizer...and similar applications.

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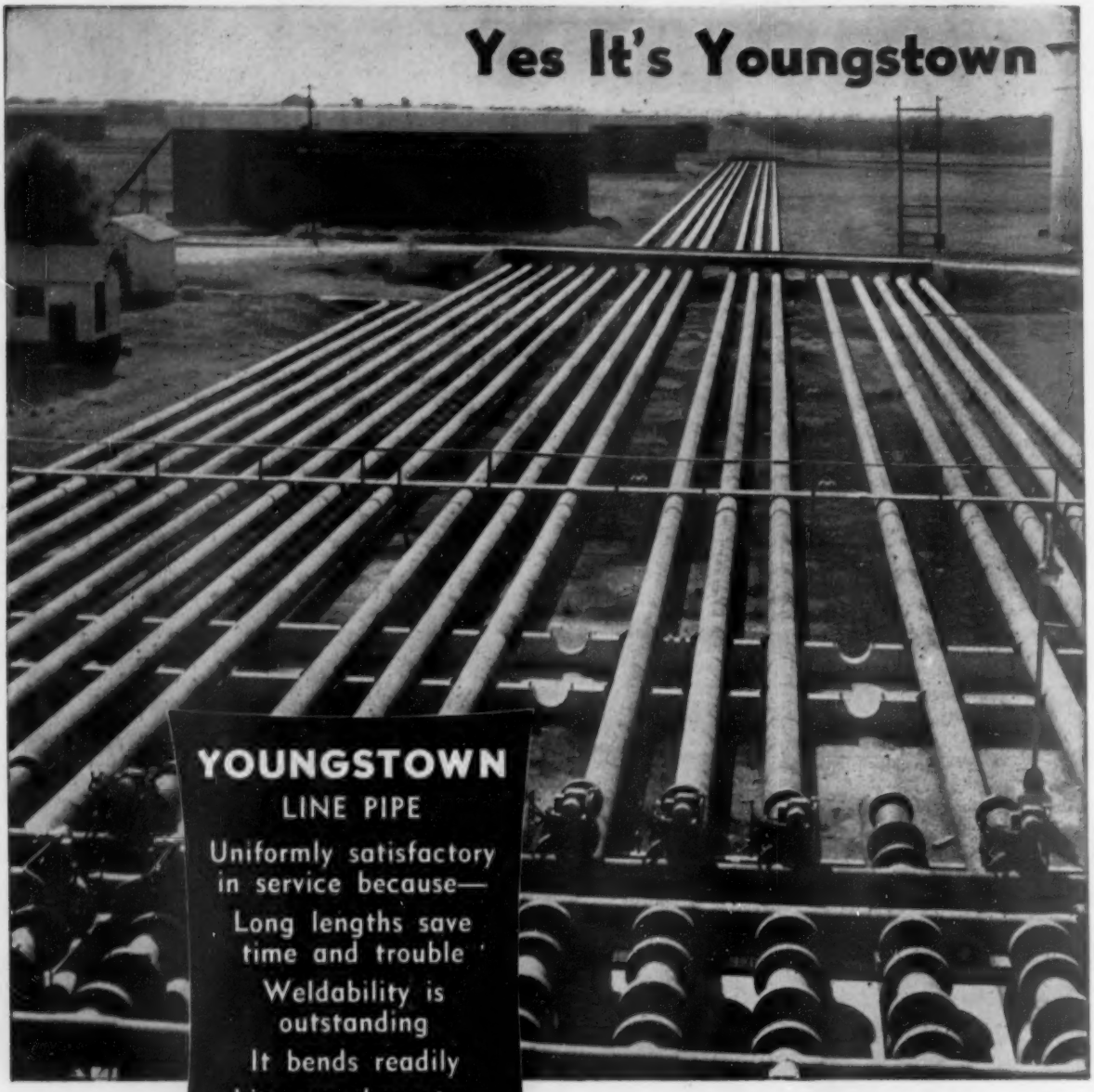

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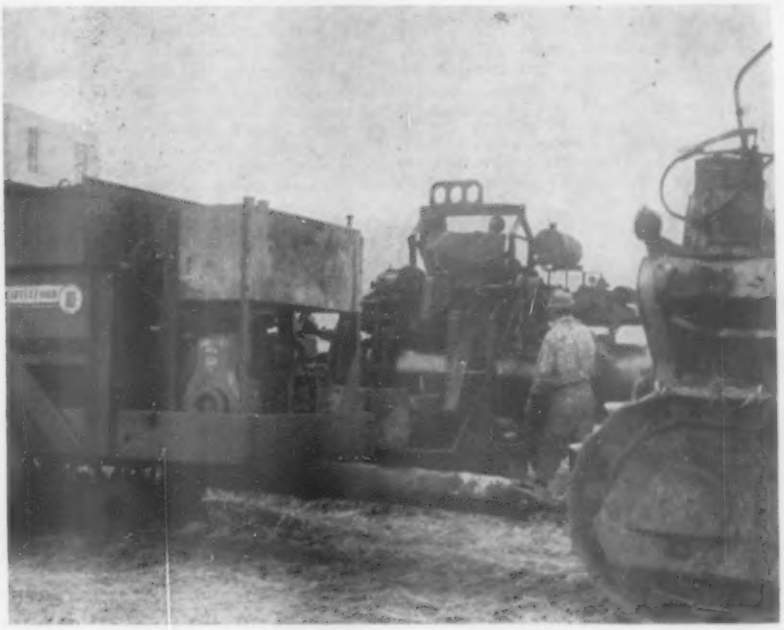
Pipeline Patrol

. . . Report on Construction



Looping Program Nearing Completion

THE Interprovincial Pipe Line Co. and its American affiliate, Lakehead Pipe Line Co., are nearing completion of their $58 million construction program, which was started in the spring of 1954. The work consists of 455 miles of 24-in. line in Canada and 197 miles of 26-in. in the United States. The work was let to three contractors, Mannix, Ltd., Anderson International Contractors, Ltd., and R. H. Fulton & Co. In the above picture, Fulton is wrapping some pipe preparatory to placing it in the ditch.

Under Way, Contracted, and Planned

PIPELINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipeline companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the job.

Crude-Oil Pipelines

Ar-Mex Pipe Line Co.—Company has applications for two lines before the Office of Defense Mobilization Board for rapid amortization approval.

1. A crude-oil line from Albuquerque, N. M., to Phoenix, Ariz. This line would serve a 20,000-bbl. refinery being planned by Frost & Associates of Dallas.

2. A crude-oil line from Guernsey, Wyo., to Albuquerque.

Magnolia Petroleum Co.—This company will operate a 48-mile, 12-in. submarine pipeline for itself and Continental Oil Co., and Newmont Oil Co. The line will run to blocks off the coast of St. Mary's Parish, Louisiana, and will have a capacity of 50,000 bbl. per day. Brown & Root, Houston, has the contract and expects to be finished by the middle of 1955.

Minnesota Pipe Line Co.—Williams Brothers Co. has contract to build this 260-mile, 16-in. crude line from Clearbrook to Hastings, Minn. The line, to cost $12,500,000, is the southern end of a system which will move crude from Fosterton field, Sask., to Great Northern's refinery which is building in the Minneapolis-St. Paul area. Present plans call for completion by July 1955.

• **NNCW Pipeline Co.**—127-mile line, proposed, from Weston County, Wyoming, to Casper. 108 miles of 10-in. and 19 miles of 8-in. Est. cost: $3,500,000.

Standard Pipe Line Co.—Company plans to build two crude lines. Applications are now before the Office of Defense Mobilization for rapid amortization approval.

1. A 350-mile, 16-in. crude line from Glendive, Mont., to Guernsey, Wyo., to connect with Platte Pipe Line Co.'s system there.

2. A 330-mile, 16-in. crude line from Wink,

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PIPE LINE SURVEYS

Pipeline Patrol

Tex., to Albuquerque, N. M. This line would serve a 10,000-bbl. refinery being planned by Frost & Associates of Dallas.

• **Union Oil Co. of California.**—Planning construction of a 60-mile crude line from its Clara Valley field to its Wilmington refinery. Line is expected to be completed by late this year. 12-in. line. Bids being asked.

Products Pipelines

• **American Pipe Line Co.**—Has received ODM approval to amortize 40 per cent of $178,000,000 with a rapid writeoff on proposed line to run from Gulf Coast area to New York City area. Bids for pipe requested.

Badger Pipe Line Co.—Company to build 195 miles of 8-10-12-in. pipeline from East Chicago, Ind., to Madison, Wis. One section of 40 miles has been let to Morrison Construction Co. of Hammond, Ind. 2d section of 32 miles from Lockport to Des Plaines, Ill., let to Contract and Material Co. of Evanston, Ill.

65 miles of 12-in. from Des Plaines to Rockford let to Contracting & Material Co. Evanston, Ill.

56 miles of 12-in. from Rockford to Madison let to Mid States Construction Co. of Mount Vernon, Ill. Whole line to be completed in January.

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-in., proposed. Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

Buckeye Pipe Line Co.—This company has awarded 80 miles of 8-in. products line between Lima and Columbus, Ohio, to Sheehan Pipe Line Construction Co. of Tulsa. The line is expected to be in operation by the end of the year.

• **California-Oregon Pipe Line System.**—103 miles 6-in., proposed, Crescent City, Calif., to Medford, Ore.

Great Lakes Pipe Line Co.—Company has started construction of a 162-mile, 10-in. line from El Dorado, Kans., to Kansas City. Capacity will be 36,000 bbl. per day.

Inland Corp.—Company owned jointly by Standard Oil Co. (Ohio) and Shell Oil Co., will construct a 38-mile, 10-in. products line from Toledo to Fostoria, Ohio. Line expected to be in operation by January 1955.

Company also planning 51-mile, 8-in. line from Fostoria to Lima.

• **International Pipe Line, Inc.**—132 miles 8-in., proposed, Wrenshall to Minneapolis, Minn. Cost: $4,200,000.

Malco Pipeline, Inc.—Company planning to build a 91-mile, 6-in. products line from its Prewitt, N. M., refinery to Albuquerque.

Moore Stoner Co.—Company has $2,500,000 tax amortization for a 200-mile, 6-in. products line from a connection with Oil Basin Pipe Line Co.'s terminal at Glendive, Mont., to Minot, N. D.

Shell Pipe Line Corp.—65 miles of 12-in. products line from Baton Rouge, La., to Shell's Norco refinery. Houston Contracting Co. has contract. H. T. Muckley, Supt. Job held up indefinitely by right-of-way difficulties.

Standard Oil Co. of Texas.—Company laying a 248-mile, 6-in. products line from El Paso to Albuquerque. The line will move 5,000-bbl. daily when finished and will cost $4,000,000. Houston Contracting Co. has job.

• **Sunflower Pipe Line System.**—Company proposes to build a 215-mile, 6-in. line to transport LPG from six counties in western Kansas to Wichita. Application approved by Kansas Corporation Commission.

Texas Eastern Transmission Corp.—Company has asked FPC permisison to abandon "Little Inch" gas line. If permission is granted, company will spend $71,000,000 converting the line to a products line with a capacity of 235,000-bbl. per day.

U. S. Gov't. Alaskan Products Pipe Line.—600 miles of 8-in. under way from Haines northward through Yukon to Fairbanks, Alaska. Williams Bros., McLaughlin, Inc., and Marwell Construction Co. are doing the work.

Natural-Gas Pipelines

• **American-Louisiana Pipe Line Co.**—1,121 miles of 30 and 22-in., 30-in., proposed, extends from North Tepetate, Acadia Parish, Loupisiana, to near Detroit. The 22-in. starts near Payne, Ohio, extends to Bridgman, Mich. Estimated cost: $130,000,000. FPC approved.

• **Arkansas Louisiana Gas Co.**—136 miles of new line proposed, to be added to present system in Arkansas, Louisiana, and Texas. Estimated cost: $9,245,166. FPC approved.

• **Carolina Natural Gas Corp.**—185 miles. 2-12-in., proposed, later lines off Transcontinental in North and South Carolina.

• **Central Hudson Gas & Electric Corp.**—Company has filed application with FPC to construct 48 miles of 12-in. line from Albany to Kingston, N. Y. Line will be started and completed in 1955 if FPC approves.

• **City of Dalton, Ga.**—Proposes to build 39 miles of 8-in. from a point of interconnection with Southern Natural's Rome-Calhoun transmission line. Estimated cost: $2,940,000.

• **City of Fayette, Ala.**—20 miles, 5-in., F.P.C. approved, Fayette, Ala., to Southern Natural's system in Tuscaloosa County, Alabama. Completion set for early 1955.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., approved by F.P.C., Green River, Wyo., to Denver, Colo., 1954.

• **Colorado-Western Pipe Line Co.**—454 miles of undetermined size pipe planned between Cortez in Montezuma County and Denver. Line would serve towns of Montrose.

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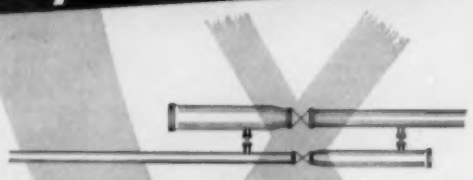

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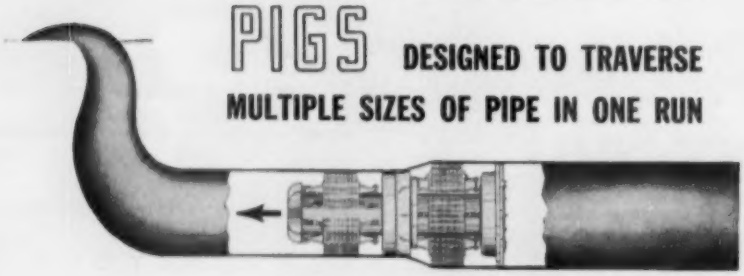
DUBL-DIAMETER PIGS DESIGNED TO TRAVERSE MULTIPLE SIZES OF PIPE IN ONE RUN



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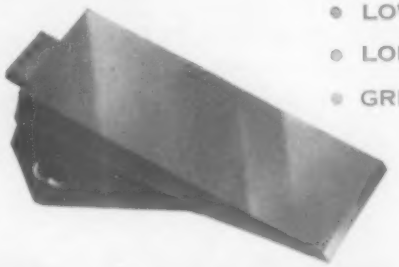

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Pipeline Patrol

Gunnison, Salida, Fairplay and South Platte, Colo. Estimated cost: $30,000,000. Company also plans 254 miles of laterals to service Colorado cities not now receiving natural gas.

328-mile line, proposed, to run from a point in La Plata County in southwestern Colorado over the Continental Divide along the eastern slope to serve Pueblo, Colorado Springs, and Denver. Estimated cost: $21,600,000.

• **Fort Worth Basin Gas Co.**—Planned, Novice, through Brown and Comanche counties, Texas.

• **Home Gas Co.**—Work under way on 24 miles of 12-in. from Halsey Valley to Westover, N. Y.

Work under way on 25 miles of 12-in. from Port Dickinson to Deposit, N. Y.

• **Hope Natural Gas Co.**—Proposing to build a 22½-mile extension of existing line from Boone County, West Virginia, to Logan-Mingo County line, West Virginia. Estimated cost: $930,000.

• **Houston Texas Gas & Oil Co.**—Company proposes to build three natural gas lines. One line would run from lower Rio Grande Valley to Chicago. The other line would go from southern Louisiana to New York City. Third line would run from Louisiana to Florida., 20, 24, 30-in., pipe considered in plans. Engineering firm reported preparing an economic report on the lines at present.

Kansas Pipe Line Corp., Inc.—Company proposes to build 16-20-in. line to Wichita. Starting point for line has not yet been established. The line, which would have a capacity of 100 million cu. ft. daily may start in the Barber-Harper County area 100 miles southwest of Wichita, or it may be necessary for the company to go farther west to the Hugoton field. The line will cost approximately $5,000,000 and will be entirely intrastate.

• **Kansas-Nebraska Natural Gas Co., Inc.** Proposes to construct 206 miles of 6-12-in. pipeline to add to present system in central and northeastern Nebraska.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

72 miles, 16-20-in., Doddridge, Wetzel and Marshall counties, West Virginia. Fulghum Contracting Co. doing work.

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

• **Michigan Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in. loops. Majority will be in Wisconsin.

• **Missouri Central Gas Co.**—25 miles, 6-in., proposed, Moberly to Macon, Mo.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo. FPC approved. Est. cost: $600,000.

• **Montana-Dakota Utilities Co.**—Proposes to build 56 miles of 2, 4, and 6-in. line from its 12-in. Cabin Creek-Bismarck line near Gladstone, N. D., to the towns of Lefor, Regent, New England, and Mott, N. D.

• Proposed 34½ miles of 12¾-in. line to run from Baker-Glendive field in Montana to Rapid City, S. D., and 14 miles of 12¾-in. to replace various lines in Park County, Wyoming, and Carbon County, Montana.

Natural Gas Pipe Line Co. of America.—Company has proposed a 280-mile line from Wise County, Texas to Panhandle field in Texas where it would connect with the NGPLCA to Chicago.

• **Natural Gas Producer, Inc.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virgina, to Narrows and Dublin, W. Va.

• **North Dakota Gas Transmission Co.**—470-mile line from Tioga plant of Signal Oil & Gas Co., and Beaver Lodge field to Fargo and Grand Forks, N. D. Line will have 78 miles of 12-in., 215 miles of 10-in., 70 miles of 8-in., and 107 miles of 6-in. Estimated cost: $10,800,000.

• **Northern Indiana Fuel & Light Co.**—35 miles, 8-in., planned, Edgerton to Auburn, Ind.

Northern Natural Gas Co.—Company has just recently finished a large summer expansion. Still planned are:

170 miles of 20-24-in. line in Minnesota and Wisconsin running from Duluth to Superior.

400 miles of 24-in. line from the Canadian border to tie in with its system at St. Paul-Minneapolis.

500 miles of 24 or 30-in. planned across North Dakota from Tioga past Minot to Fargo and from there eastward to the Twin Cities.

• **Northwest Alabama Gas District.**—40 miles, 9-in., proposed, Southern Natural's line through Winfield to Haleyville, Ala.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash. Approved by FPC.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

• **Pine Tree Natural Gas Co.**—204 miles of undetermined size pipe to run from the Boston area to Bangor, Me.

• **Shenandoah Gas Co.**—40 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va. Est. cost: $1,470,000. FPC approved.

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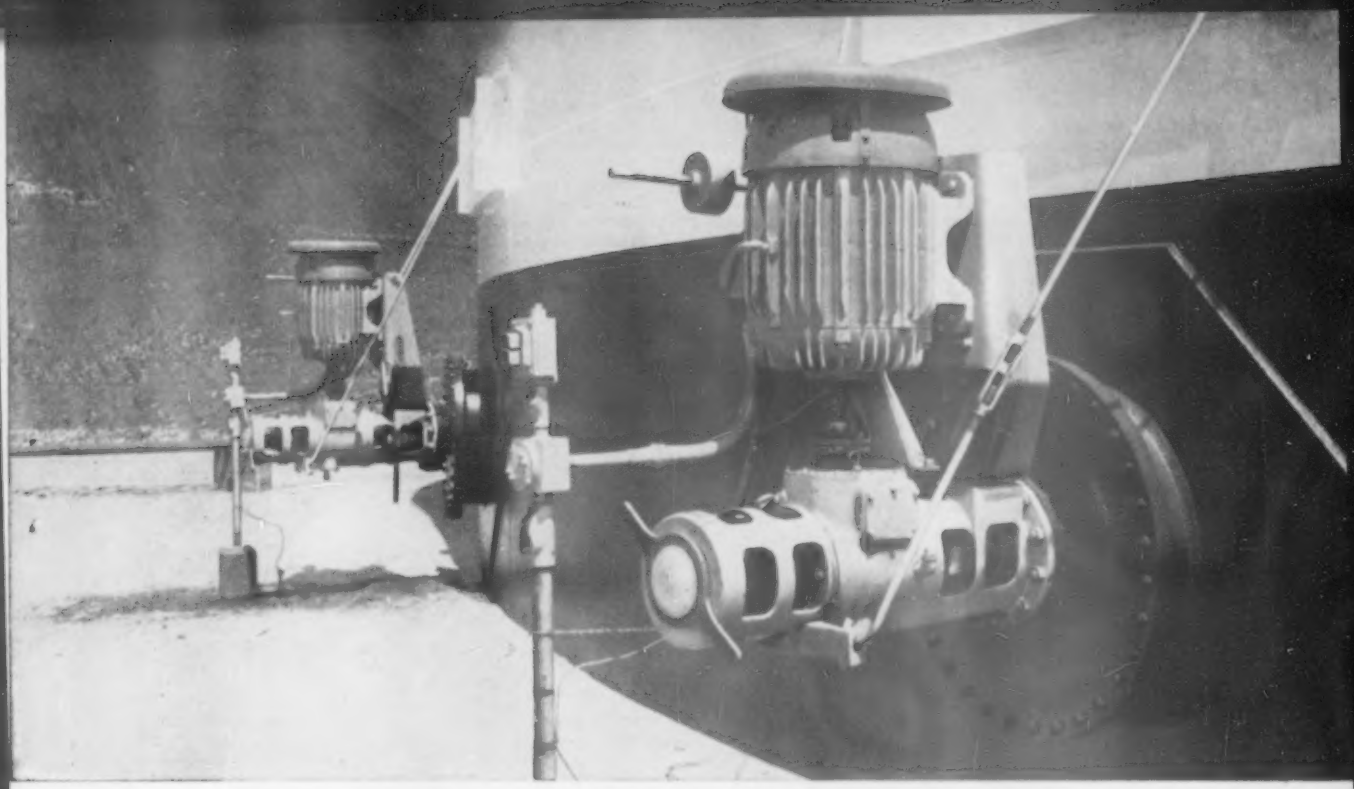

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1. By eliminating an expensive cleaning job. This would have cost as much as the mixer—just once.
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Pipeline Patrol

• **South Georgia Natural Gas Co.**—368 miles, 2-12-in., planned, Phoenix, Alta., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee. Est. cost: $9,000,000. FPC approved.

• **Southwest Alabama Gas District.**—150 miles, 10 and 8-in., planned, Phoenix City to Dothan, Ala. Engineering Const. Co.

Tennessee Gas Transmission Co.—243 miles 24-in., planned, Coudersport, Pa., eastward across Pennsylvania, New Jersey, and New York to point near Greenwich, Conn.

• **Texas Eastern Transmission Corp.**—Proposed, 382-mile, 24-in. line from Kosciusko, Miss. to Beaumont, to connect with the existing 30-in. line there to Connellsville and replace the "Little Inch" in moving natural gas.

• Company proposes to build 58 miles of 20 and 16-in. pipeline from Joaquin to Longview, Tex. Cost: $3,269,000. FPC approved.

• **Transcontinental Gas Pipe Line Corp.**—421 miles, 30-36-in., looping along Texas-New York line. Before FPC.

• 19 miles of 12.75-in. pipe starting at West White Lake field in Vermilion Parish, Louisiana, and connecting with applicant's transmission line in same parish. Estimated cost: $1,042,310. FPC approval received.

• **Trunkline Gas Co.**—Proposes to cross the Mississippi River with two 24-in. lines near Greenville, Miss. Est. cost: $2,960,000.

• **Utah Natural Gas Co.**—Planning 40 miles from Orem to Salt Lake City, 16-in. pipe at later date. Contract not let yet.

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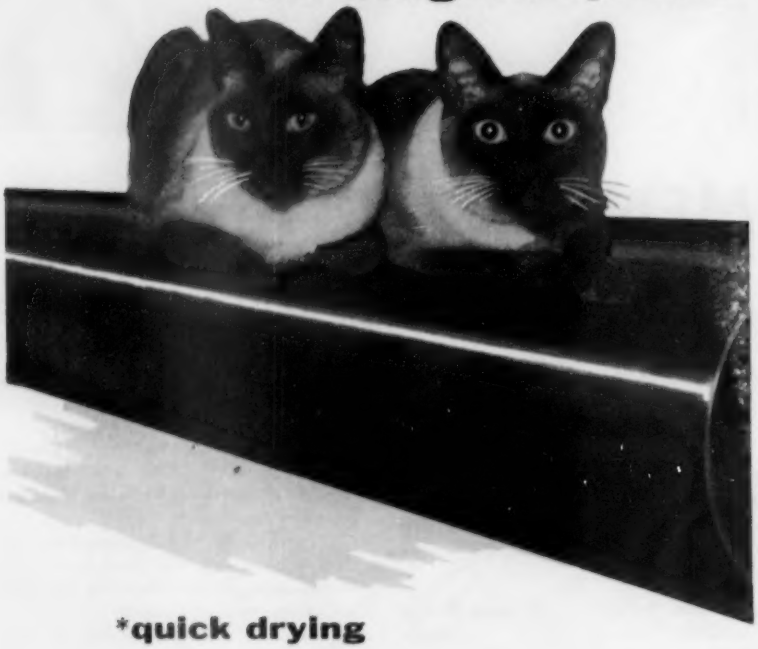

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Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Westcoast Transmission Co., Ltd.—Company has signed agreement with Pacific Northwest Pipeline Corp. and has revived plans for its line from the Peace River area of Alberta to the United States border near Vancouver, B. C. Tentative plans call for work to begin sometime in 1955.

Foreign Crude-Oil Pipelines

• **Atlas-Dresser.**—Included in this company's agreement with the Argentine Government are plans to built a 400-mile, 16-in. crude line from Plaza Huincul area to Bahia Blanca.

Bombay Port Trust.—50 miles, 8 to 24-in., contracted, Bombay, India, to serve Standard Vacuum Oil Co., and Burmah Shell refineries. Merritt, Chapman & Scott Corp., contractors. (Crude and Products). Collins Const. Co. has subbed 84,000 ft. of Subaqueous work. Shutdown for Monsoon season during summer. Work resumed September 15.

Compania Shell De Venezuela.—Company will build a pipeline from its Block I field off the western shore of Lake Maracaibo to its terminal at Palmarejo. The line will be known as "Lapline" and will run 18 miles in the lake and 27 miles on land. The underwater section will be 16-in., and the remainder will be 24-in.

Interprovincial Pipe Line Co. and Lakehead Pipe Line Co.—Contracts have been awarded for 604 miles of looping; 454 miles will be in Canada, the remaining 150 miles will be in the United States.

201 miles of 24-in. between Regina and Gretna, Man., have been awarded to Anderson International Contractors, Ltd., of Edmonton, Alta.

Mannix, Ltd., of Calgary, Alta., will lay 129 miles of 24-in. line between Edmonton and the Alberta-Saskatchewan boundary.

Fulton-Bannister, Ltd., has contract for 125 miles of 24-in. line to connect the lines being built by Anderson and Mannix.

R. H. Fulton & Co., of Lubbock, Tex., has the contract for 104 miles of 26-in. looping from the Canadian border southeast. Anderson Bros. Corp. has contract for 50 miles of 26-in.

Peace River Oil Pipe Line Co., Ltd.—Company plans to build a 16-in. line connecting Sturgeon, South Sturgeon, and Little Smoky fields in Alberta to a planned 106-mile, 12-in. line which would move the crude south to Trans Mountain Pipe Line Co.'s Edson, Alta., station.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

Texas Petroleum Co.—Contract has been let to Foster Wheeler Corp. and Panama-Williams for a 119-mile 12-in. crude line to move oil from Velasquez field in Colombia to a connection with the main Andian National system at Galan. Est. cost: $6,000,000.

• **Yacimientos Petrolliferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Yacimientos Petrolliferos Fiscales Bolivianos.—Bolivian Government oil organization has awarded contract to Williams Brothers, Sudamericana, Ltd., to construct a 6-in. crude line from Camiri field to Yacuiba on the Argentine border. The project will cost approximately $2,500,000.

Foreign Products Pipelines

Australasian Petroleum Refinery, Ltd.—Company plans two lines from the new

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Available frequency space is utilized most efficiently, offering more systems in one band, thus giving added protection against obsolescence—a major economic advantage. The new system can feed into existing RCA systems and so be added to your present equipment.

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Conventional triode tubes, unregulated power supply, familiar circuits, obviate the need for specially trained personnel. Tuning is simplified because the frequency is controlled from the terminal through the entire system.

Microwave is today's most modern form of radio for private communications systems. A radio beam carries communications and control signals from one place to another, following a narrow line-of-sight path. RCA was one of the first to pioneer in Microwave. Today its installations cover the nation and the globe. Only RCA systems provide so many advanced engineering features. Microwave specialists will be glad to answer any questions and plan your installation. Mail Coupon below for further particulars.

New stylized racks with doors feature modern functionalized design and open back for ease of servicing. Open cabinet shows complete Microwave Terminal. Closed rack shows stand-by equipment.

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Please send me new booklet on RCA MM-26 Microwave—a system for the uncrowded 2450-2700 mc band, designed for pipelines, utilities, railroads, turnpike, common carrier.

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No need to experiment. Since 1941, TAPECOAT has proved its ability to keep vulnerable steel surfaces "like new" year after year. *That's why it is specified where continuing protection is the first consideration . . .* on pipe, pipe joints, tanks, etc. above ground and under ground. Available in handy rolls in widths from 2" to 24". Easy to apply. Cuts maintenance and replacement costs. Write for details and prices.

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Originators of Coal Tar Tape Protection
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Pipeline Patrol

Kwinana refinery in western Australia to the port of Fremantle to be completed early in 1955. One line will be 15 miles of 12-in. The other line will be a 17-mile, 6-in. line.

• **Empresa Nacional del Petroleo** — 80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

• **Governments of Southern Rhodesia and Portugnese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

North Atlantic Treaty Organization (NATO).—1,920 miles, 4-10-in., to serve military bases in Western Europe (to connect with U. S. Government's St. Nazaire-Paris-Metz line). Contracted by Soc. Foster Wheeler Francaise.

Overland Pipeline Corp.—This South African firm has requested government permission to build a 350-mile line, to cost $8,450,000, from the South African coast to Rand, a plateau area in southern Transvaal where there is heavy petroleum consumption.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

• **United States Navy Department.**—Proposed 300-500-mile line to be built in Spain to serve a proposed naval base and four large air bases which are also proposed under a defense agreement with the Spanish Government. No definite size or cost is known now.

Winnipeg & Central Gas Co.—Canadian company plans to build a $20 million butane-propane system. Company plans to get gas L.P.G. from Signal Oil & Gas Co.'s Tioga, N. D. plant and move it to Winnipeg. Size and route of the line has not been definitely established.

Foreign Natural-Gas Pipelines

Alberta Gas Trunk Line, Ltd.—This Canadian firm has let engineering contracts to two firms, Dutton, Williams Brothers, Ltd., and Mannix, Ltd. for a 300-mile, big inch gas-gathering system to collect Alberta's natural gas for transportation to Trans Canada Pipe Line Co.

Attock Oil Co.—Company plans to build 60-mile natural gas pipeline from Dhulian field to Rawalpindi in West Pakistan.

Azienda Generale Italiana Petroli — 90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, con-

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

• **Empresa Nacional del Petroleo** — 80 miles, 10-in., planned, Concon to Santiago, Chile.

Petroleos Mexicanos. — 205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

• **Petroleos Mexicanos.**—440 miles, 20-in., planned, Brazil to Tampico to Poza Rica, Mexico.

Sui Gas Transmission Co., Ltd.—Morrison-Knudsen Construction Co. has contract to build 350-mile, 16-in. line from Sui field to Karachi in West Pakistan. Est. cost: $25,000,000.

• **Trans-Canada Pipe Lines, Ltd., Canadian Delhi Oil Co.)**—2,247 miles, 14 to 30-in., proposed, Alberta to Toronto to Montreal.

747 miles, 8 to 24-in., gathering system in Alberta.

Private Interests.—Proposes to build gas line from Gubik gas field near Navy Petroleum Reserve No. 4 in Alaska to Fairbanks. Line would be 450-mile, 8-in. line and Arctic Contractor, Inc., who handled engineering requirements and preliminary design estimated the line would cost $20,000,000, although later figures have been much higher than this.

BOOK

ROCKY MOUNTAIN ASSOCIATION OF GEOLOGISTS GUIDEBOOK—1954 FIELD CONFERENCE—FIRST TRIP—DENVER TO COLORADO SPRINGS AND RETURN. Available from the association, 601 Continental Oil Building, Denver. 16 pp.

This guidebook covers the spring field conference conducted by the association from Denver to Colorado Springs. Included are a road log, a surface outcrop map, and a generalized stratigraphic section.

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SINCE 1926

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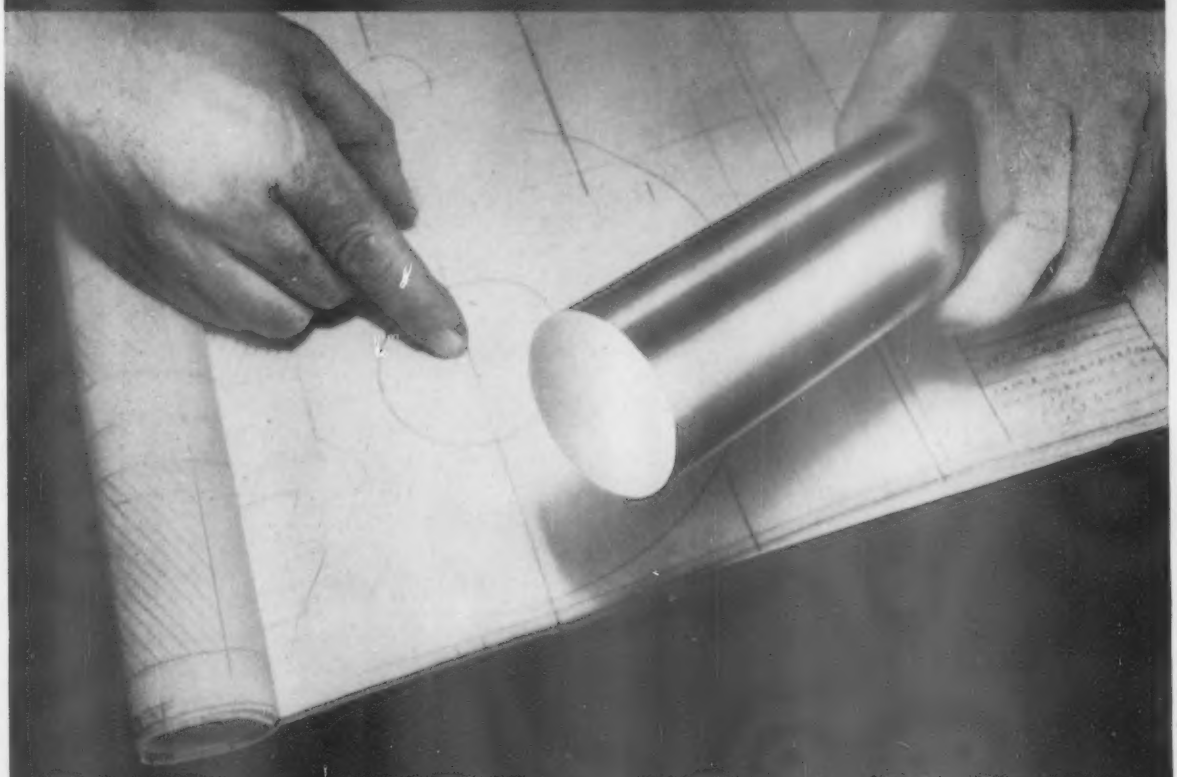

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Our qualified technical staff can show you exactly how you can realize the greatest production savings through the use of the *right* alloy steel. And the complete stocks at each of our warehouses, located from coast to coast, assure you of getting the right alloy for the job.

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Call us any time for any type of alloy steel: USS Carilloy alloy steels—hot rolled rounds, cold finished rounds, squares, hexagons, "FC" (Free-cutting) rounds; USS Carilloy Aircraft Quality hot rolled rounds and flats and cold finished rounds, squares, hexagons and flats.

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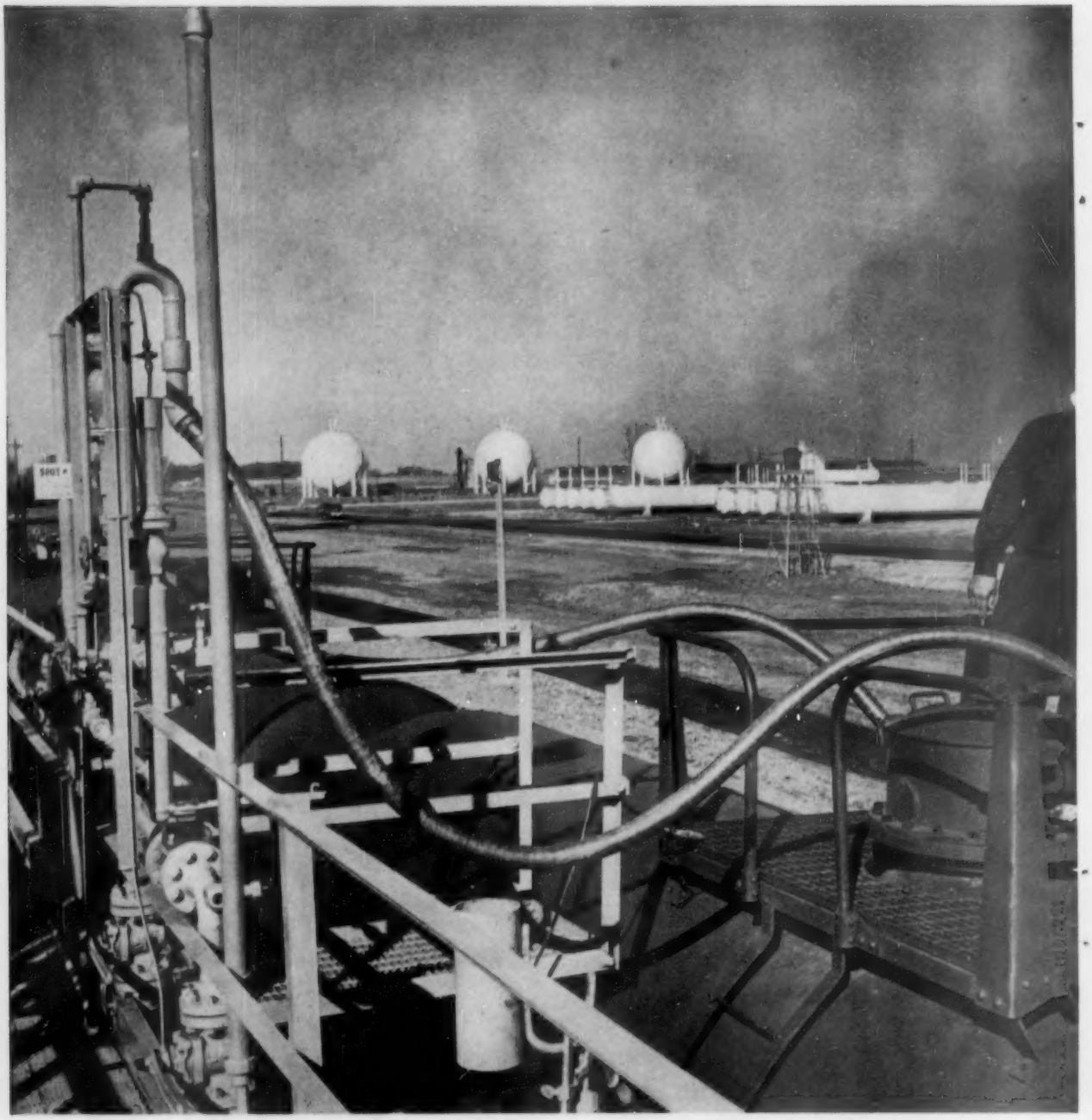

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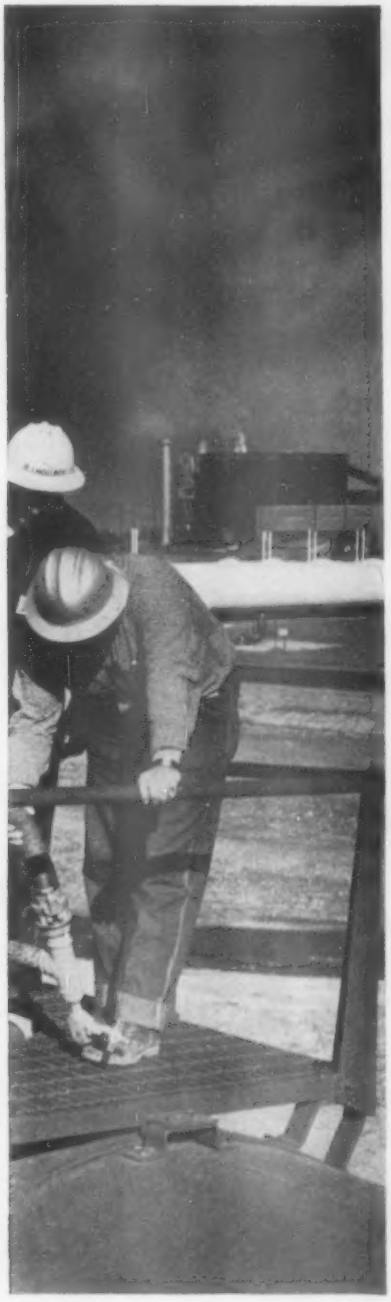
EXECUTIVE OFFICES, STAMFORD, CONNECTICUT

Cross Propane Hose at Work!



At this new plant of the National Petro-Chemicals Corporation at Tuscola, Illinois, 113 lengths of Hewitt-Robins Maltese Cross® LP-Gas Hose are used to load propane and other hydrocarbons at the rate of 27 tank cars and 30 tank trucks per day. To insure steady production, eliminate chance of costly breakdowns, the engineers who designed and built these loading racks specified Hewitt-Robins Maltese Cross Propane Hose equipped with Hewitt-Robins couplings because it's stronger . . . safer . . . tougher . . . resists penetration of liquefied petroleum gases . . . is easier to handle!

Whether you're handling liquids or gases, Hewitt-Robins can benefit your operation with maximum hose safety, economy and performance. We manufacture over 1,000 types of industrial hose; there's one to meet your need!

ENGINEERING DATA

MALTESE CROSS PROPANE HOSE—Synthetic Tube and Cover, Braided, Mandrel Cured.

TUBE: Thick, compounded synthetic, specially formulated to resist permeating action of liquefied petroleum gases.

CARCASS: Strong, braided rayon cord, impregnated in resilient synthetic rubber, closely braided at correct angle to withstand highest pressures. Spiral of non-corrosive wire in the hose wall dissipates static. Positive electrical connection is assured by factory testing every length.

COVER: Tough, tan weather- and abrasion-resistant. Will withstand prolonged exposure to sunlight and abuses common to propane service.

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that will help you cut handling costs and increase operating efficiency.

MACHINERY

- Belt Conveyors
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- Mine Conveyors
- Reclaiming Systems
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- Stackers & Trippers
- Vibrating Conveyors & Screens

INDUSTRIAL RUBBER PRODUCTS

BELTING:

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- Elevator
- Transmission

HOSE:

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- Barge Loading
- Dust Suction
- Fire
- Fuel Oil & Gasoline
- Gasoline Pump
- Mud Pump Suction
- Oil Suction & Discharge
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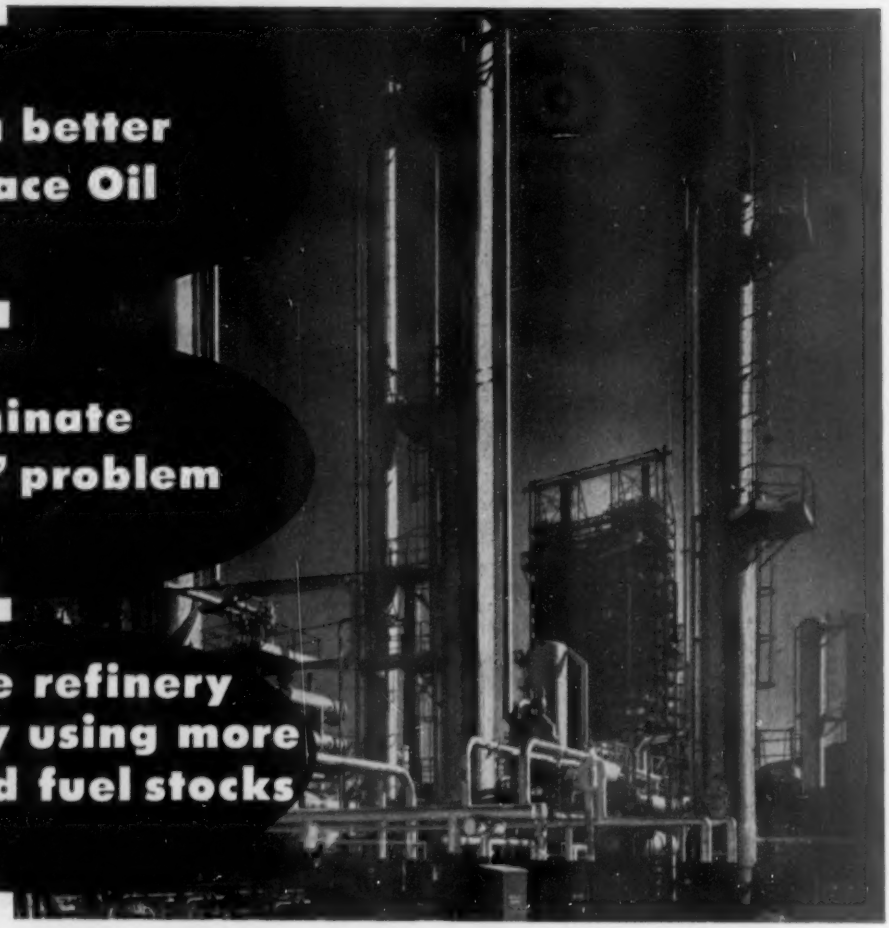
With NEW Dispersant FO



Dispersant FO is a new gum-dispersing, rust-inhibiting additive that greatly reduces, even eliminates, deposits and screen clogging in home heating units and storage tanks. Your product with FO will offer dealers many competitive advantages and greatly reduce their number of costly service calls due to clogged filter screens and nozzles.

"Wet fuel" is always *the big problem* for the distributor, dealer and home user. The active ingredient in FO is an entirely new chemical, developed especially for use in furnace oils. NEW DISPERSANT FO DOES NOT EMULSIFY WATER WITH BURNER OIL. It will settle the water out of burner oils in short order to provide a "dry" fuel.

Furnace oil with FO has exceptional rust-proofing properties. Steel and iron surfaces in contact with the oil and the water layer are made corrosion resistant.

This new additive improves stability and permits the blending of higher percentages of cat-cracked stocks without additional gum formation. It improves refinery balance, and you can cut costs by reducing the severity of acid treating of your cat-cracked heating stocks.

The stabilizing action and rust-inhibiting quality of Dispersant FO are obtained at very low dosages. Usually added in the ratio of 1 pint per 1000 gallons of oil stock, at any temperature, prior to shipment by tanker, pipe line or truck.

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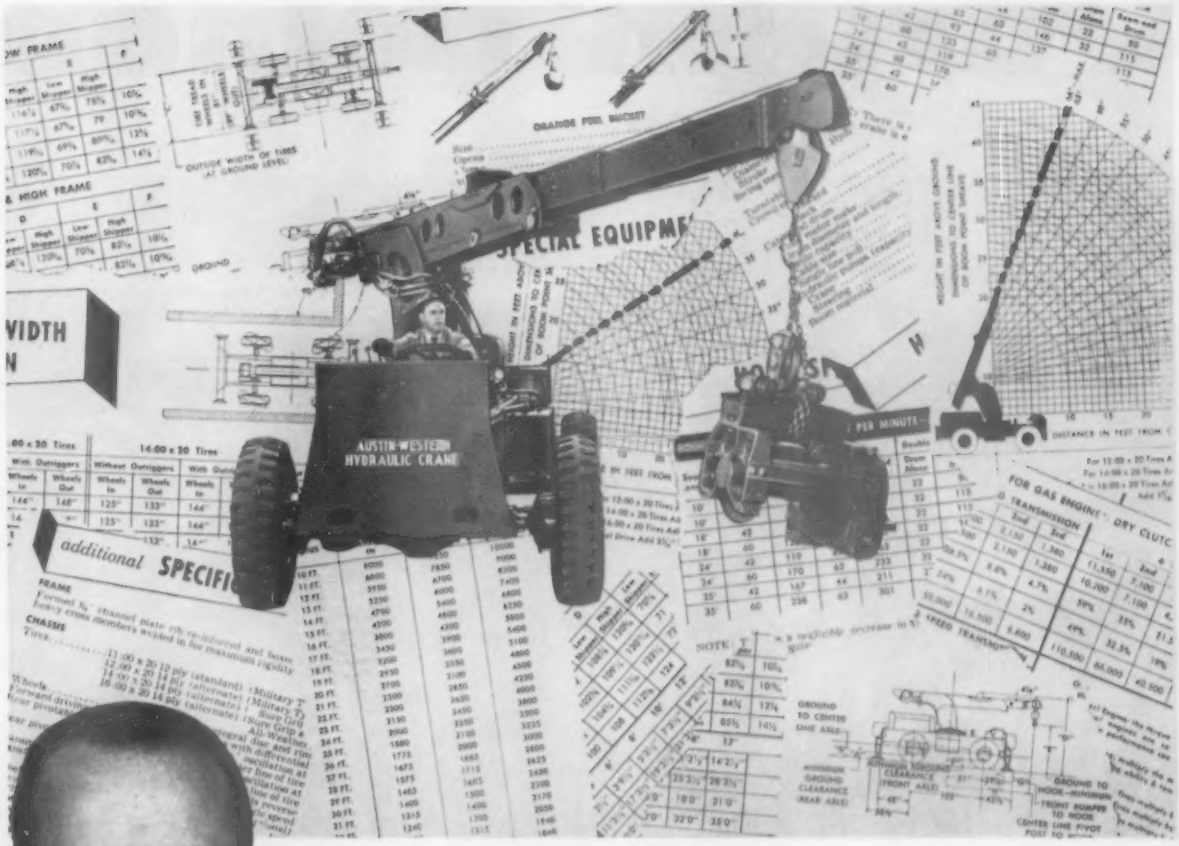
ORONITE CHEMICAL COMPANY



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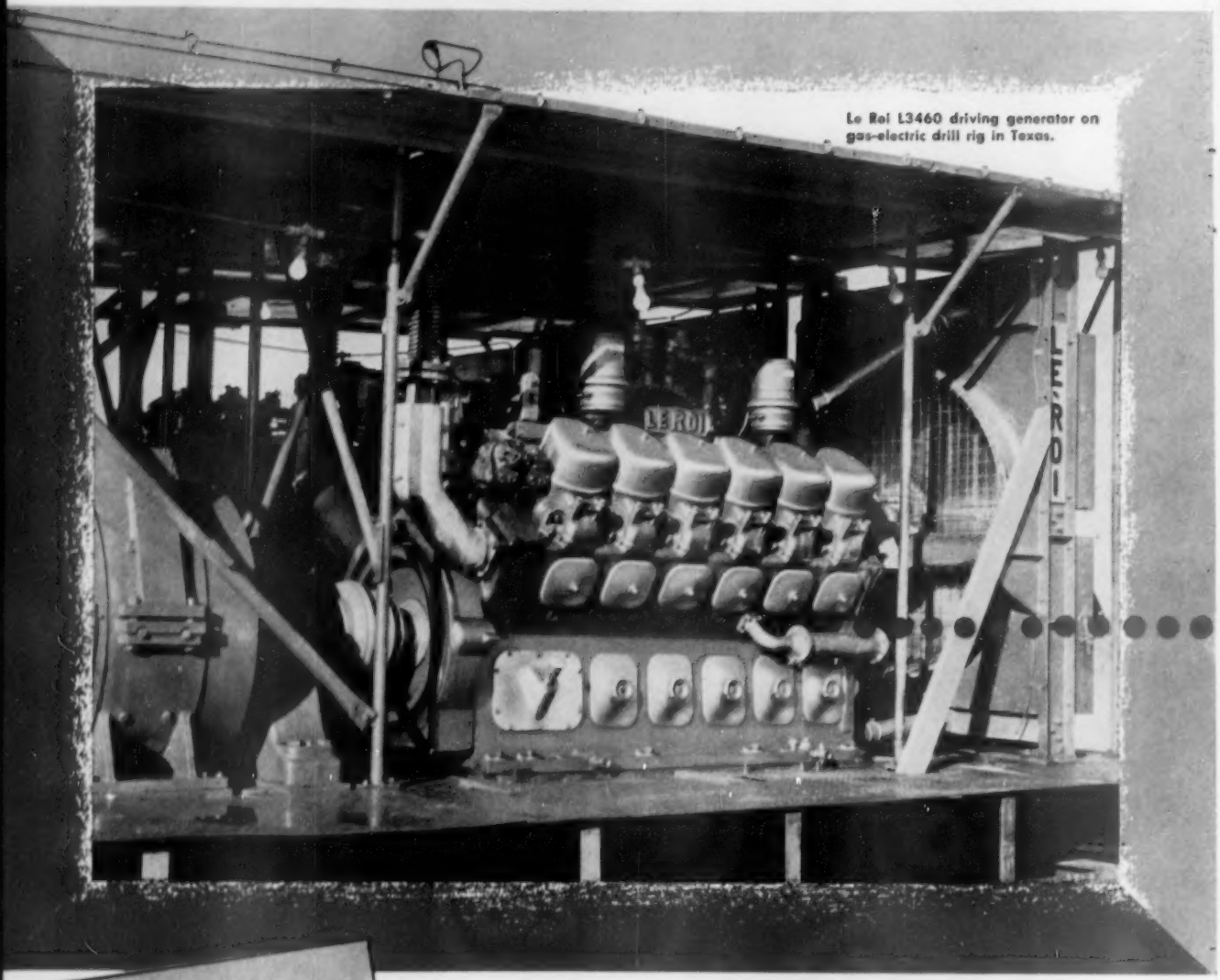

Le Roi L3460 driving generator on gas-electric drill rig in Texas.

OILFIELD SALES-SERVICE NETWORK

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Le Roi Company Branch — Tulsa
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Southern Engine and Pump Company — Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, New Orleans, Louisiana.

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General Machine & Supply Co. — Odessa, Snyder, Texas.
Nortex Engine & Equipment Co.—Wichita Falls, Texas.

Kansas
Carson Machine and Supply Co.—Great Bend

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Gehring Equipment Co. — Casper, Wyoming, Rangeley, Col.

Mississippi, Arkansas and Northern Louisiana
Ingersoll Corporation — Shreveport, Louisiana, El Dorado, Arkansas and Clarksdale, Jackson, Mississippi.

West Coast
Le Roi Engine Sales Co. — Long Beach, California

Appalachian Area
P. C. McKenzie Co., Pittsburgh, Bradford.

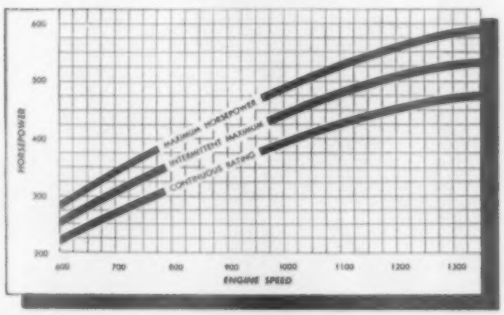
Canada
Lucey Export Ltd. — Calgary, Edmonton, Alberta.

on any rig!

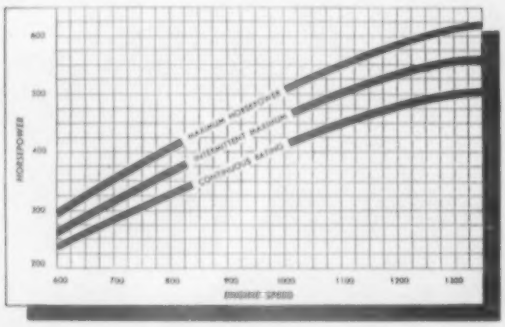
LE ROI L3460

gives you the reserve power, lightning-fast acceleration, and stamina you need for deep holes

Gasoline or natural gas

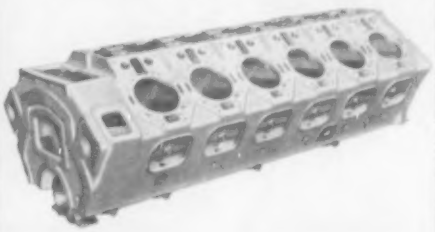


Butane

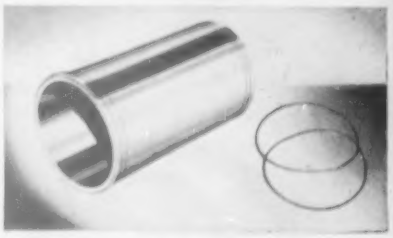


More Power — Wider Speed Range

Valve-in-head design lets one man remove cylinder heads without disturbing manifold, carburetor, or controls.



One-piece crankcase and cylinder construction provides unusual rigidity—prevents misalignment. An example of how the L3460 is built to take the punishment of oilfield handling.



Replaceable cylinder sleeves do away with costly reboring and expensive oversize parts.

A Le Roi L3460 gives you what it takes to bottom at low cost.

It's a conservatively rated engine. That means there's plenty of power with unmatched acceleration. And when you want this power, you get it right off the bat by just opening the throttle.

The L3460 has many other desirable characteristics: A wide speed range from 600 to 1350 rpm. Horsepower from 350 to 600 max. Dependability and economy under continuous loads. Lugging power at slow speeds. Compactness that helps you stay within overall width and weight limitations. Accessibility that simplifies maintenance.

The L3460 is a versatile engine. It's not only ideal for drilling rigs, but it more than pays its way on other oilfield applications — pumping, power-generation, etc.

Like all Le Roi engines, the L3460 operates on the most economical fuels in the oil fields, natural gas and butane — as well as gasoline.

Ask your supply house or Le Roi distributor to show you the L3460 and other Le Roi engine installations. Make arrangements soon.

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Milwaukee 14, Wisconsin

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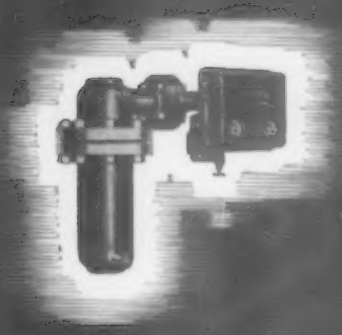

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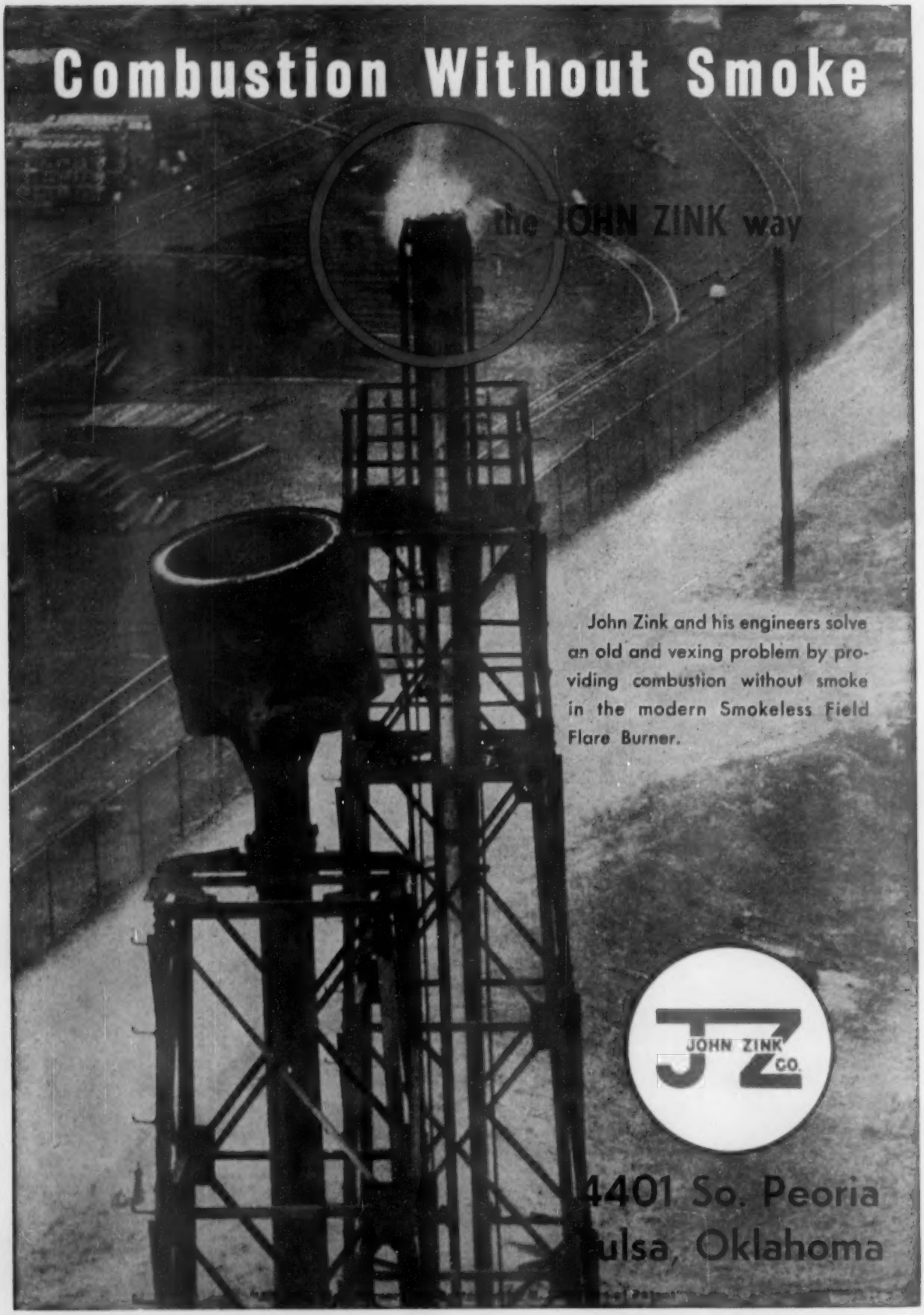
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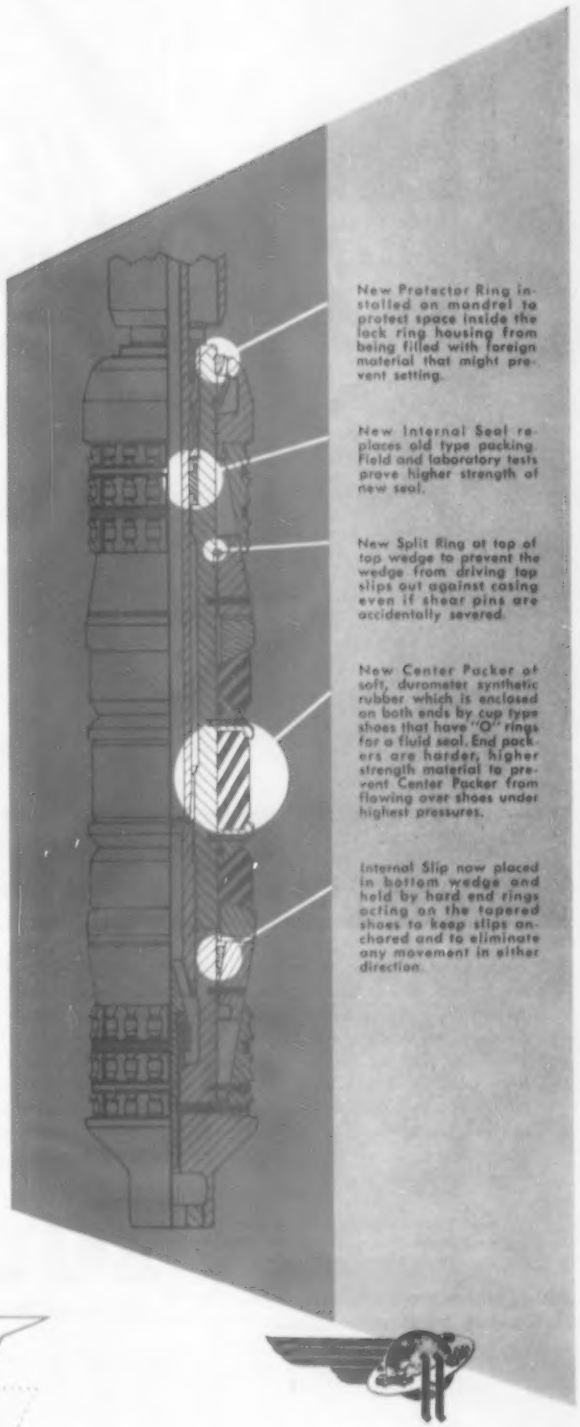
SQUEEZE PACKERS

Five important design changes in the DM and DC Squeeze Packers—the tools that have already established field records for successful squeezing and bridging—now give you a more positive seal in casing and improved operating features *under all conditions*. Both the DM Packer, made of drillable magnesium alloy for a tight temporary plug, and the DC Packer, made of drillable cast iron for a tight permanent plug, have these new improvements that permit precise control of squeezing and bridging in deep hole operations.

Halliburton's Squeeze Packers are the consistently dependable tools for forming an effective plug for squeezing cement or fluid below the packer through the tubing or drill pipe; for squeezing around the shoe or shoe joint; and for preventing fluid movement through the packer from either direction. Designed to handle these jobs under pressures in excess of 10,000 p.s.i., the new Squeeze Packers give new protection to casing or tubing, to pay zones and production.

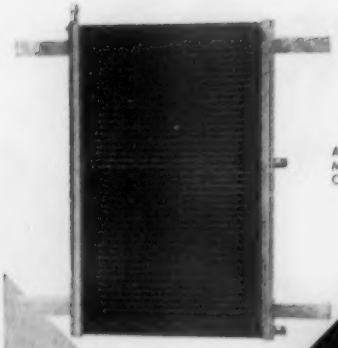
The simplified setting operation—a positive mechanical action of rotating tubing to the right—is typical of the engineered advantages that make perfect runs possible time after time. You can be sure of the rugged dependability you need when you order a Halliburton DM or DC Squeeze Packer. It's the precision tool developed by Halliburton—the world's most experienced cementers. Call your local or district Halliburton office. Halliburton Oil Well Cementing Company.


New Protector Ring installed on mandrel to protect space inside the lock ring housing from being filled with foreign material that might prevent setting.
New Internal Seal replaces old type packing. Field and laboratory tests prove higher strength of new seal.
New Split Ring at top of top wedge to prevent the wedge from driving top slips out against casing even if shear pins are accidentally severed.
New Center Packer of soft, durometer synthetic rubber which is enclosed on both ends by cup type shoes that have "O" rings for a fluid seal. End packers are harder, higher strength material to prevent Center Packer from flowing over shoes under highest pressures.
Internal Slip now placed in bottom wedge and held by hard end rings acting on the tapered shoes to keep slips anchored and to eliminate any movement in either direction.

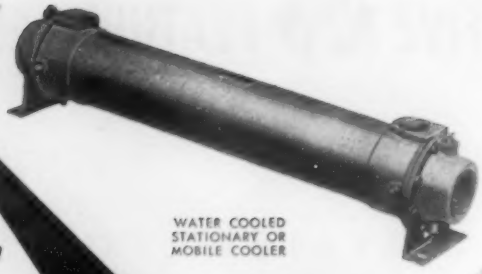
HALLIBURTON

CEMENTING SERVICES

THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING



AIR COOLED MOBILE COOLER

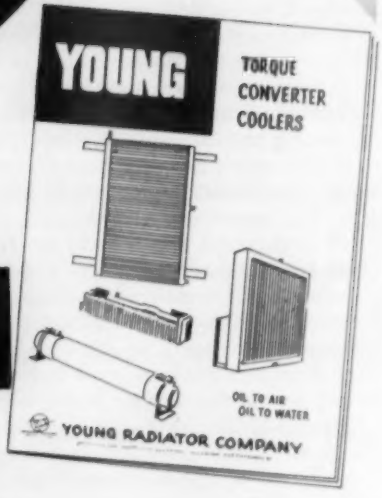


WATER COOLED STATIONARY OR MOBILE COOLER

NEW...

YOUNG offers a complete cataloged line of TORQUE CONVERTER COOLERS

AIR COOLED STATIONARY COOLER



. . . for mobile and stationary applications up to 600 hp. Applications above 600 hp. to special design

Now Young supplies industry the first catalog ever issued on a complete stock line of Torque Converter Coolers. These coolers are engineered for any *mobile* or *stationary* application from 50 to 600 hp . . . for oil-to-air or oil-to-water cooling. Young air cooled *mobile* oil Coolers are designed for 150 and 300 hp engines. *Stationary* type oil-to-air Coolers are available in 4 models; OCS 175, 300, 450 and 600 for engines from 100 HP up. Also, 11 standard water-cooled shell and tube type Coolers are built for *mobile* or *stationary* application. Shipment from stock makes possible quick delivery at lower unit cost. For further details see your nearest Young Representative.

Send today for the FREE new Young Torque Converter Cooler Catalog No. 1054. It contains product features and illustrations, dimension and performance data on the entire Young Line.

Heat Transfer Products for Automotive, Agricultural, Industrial, Gas and Diesel Engine Application.

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Heating, Cooling, Air Conditioning Products for Home and Industry.

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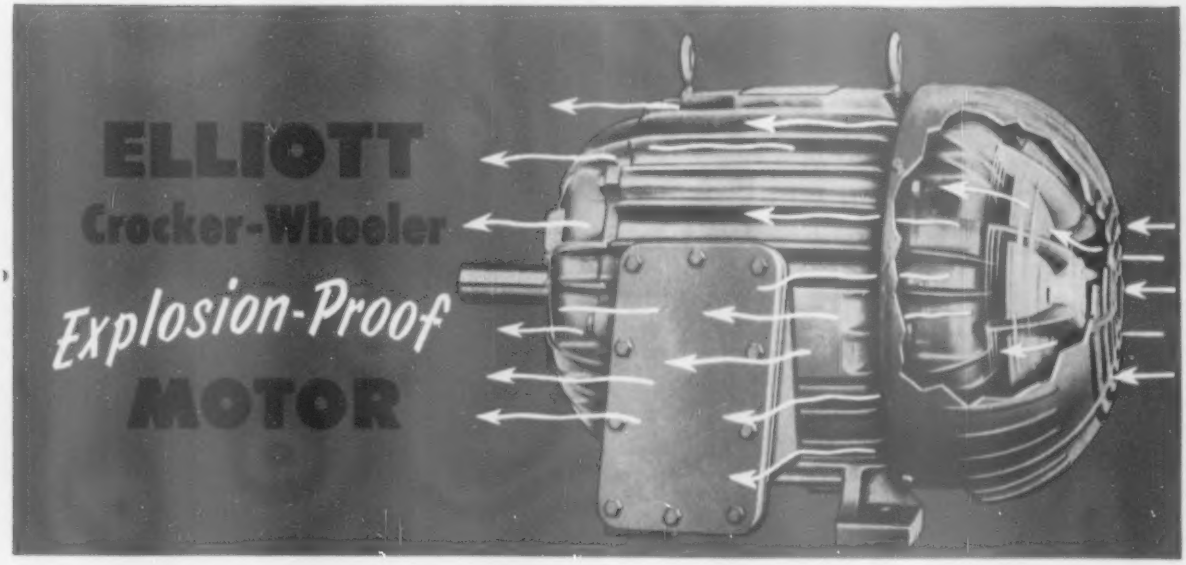
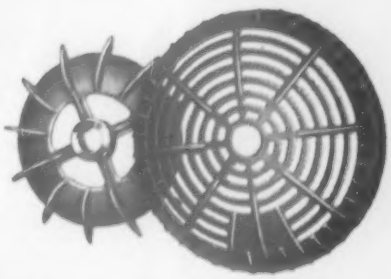
Shell and Tube Heat Exchangers | Automotive and Industrial Radiators | Unit Heaters | Convector Radiators | "YAC" Air Conditioners | Heating and Cooling Coils | "HC" Cooling and Condensing Units

It's self-cleaning!
It's self-cooling!
It's explosion-proof!



Here's a totally-enclosed motor that acts as its own heat exchanger, driving a directed blast of air around the *outside* of the motor along the full length of the heat-radiating fins. This air blast not only sweeps off heat as fast as it is developed, but also prevents the settling of dust or other material on the motor, building up an additional barrier to the release of heat.

Now available with explosion-proof enclosure, underwriters approved, the Elliott Crocker-Wheeler Sealedpower is an ideal motor for hazardous locations, indoors or out. Refineries, natural gasoline plants, pipe lines, chemical plants, flour mills — everywhere in fact where totally-enclosed motors with explosion-proof qualities are a must — are using rugged Elliott C-W Sealedpower motors with full satisfaction. In NEMA frames, ratings to 100 hp. For full data, contact your nearest Elliott district office or write Elliott Company, Jeannette, Pa.



THE FAN AND COWL. *Fan is one-piece, non-sparking bronze. The cowl is of gray cast iron, so designed as to direct the flow of cooling air along the outside surface of the frame.*

ELLIOTT Company

W 19

TURBINE-GENERATORS · TURBINES · MOTORS · GENERATORS · DEAERATING HEATERS · EJECTORS · CONDENSERS · COMPRESSORS · TURBOCHARGERS · TUBE CLEANERS · STRAINERS

MORE POWER TO TRINIDAD

(CANADA)

. . and to Trinidad's customers with

Platforming

something to be pleased about

HERE'S ANOTHER EXAMPLE of the remarkable results now being obtained with the UOP Platforming process. It is also an example of progressive thinking . . . and progressive acting . . . on the part of Trinidad Leaseholds (Canada) Limited.

By installing this UOP Platformer, Trinidad has greatly improved its position as a producer of high quality motor fuels. Former refining methods required the use of almost the maximum amount of tetraethyl lead in order to meet octane requirements of Trinidad's marketing area. With the Platformer, Canadian crudes are being processed . . . the octane numbers have been substantially raised . . . and a sharp reduction in the amount of tetraethyl lead used has been accomplished.

The finished product . . . well above average octane for the southern Ontario marketing area . . . enables Trinidad to supply its 500 retail outlets with an exceptionally high quality motor fuel on a more profitable basis than was possible before.

Trinidad's Platformer has a design capacity of 1,500 B/SD. However, provision has been made to raise the capacity to 2,300 B/SD in line with a planned modernization program which will result in Trinidad doubling the daily throughput of its refinery.

Platforming . . . the catalytic reforming process which pioneered the use of platinum catalyst . . . offers many important advantages. Why not talk over with us the application of Platforming to your operation?

UNIVERSAL OIL PRODUCTS COMPANY

UOP

30 ALGONQUIN ROAD,
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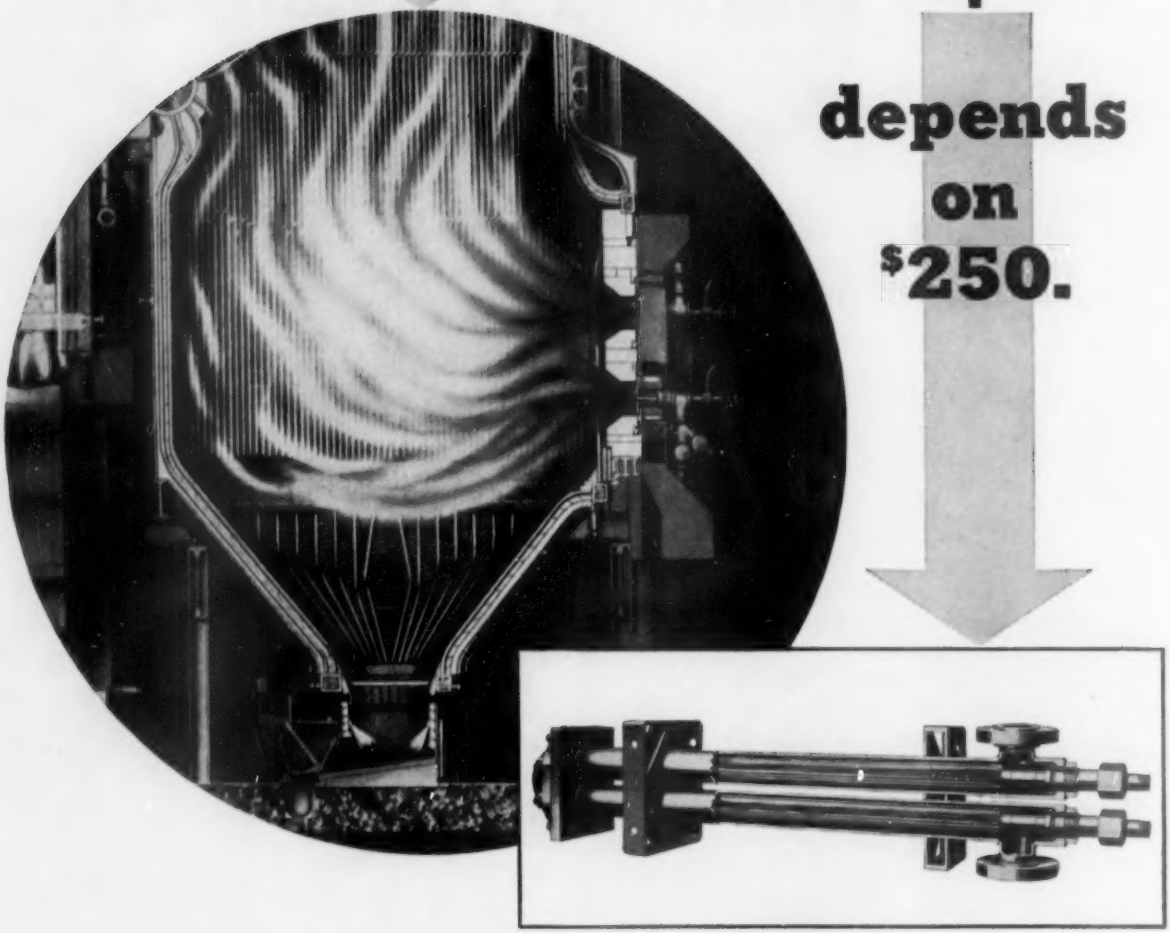
Laboratories: RIVERSIDE, ILLINOIS

Universal Service
Protects Your Investment

Where $250,000..... depends on $250.



Many large-capacity high-pressure oil-burning boilers cost as much as a quarter of a million dollars; while the little fuel oil heaters that serve them cost only a few hundred dollars. But these huge boilers can deliver the desired steam only if the little heaters maintain rated capacity and preheat the fuel oil sufficiently to assure free flow.

G-R Fuel Oil Heaters will give your boilers . . . and you . . . this assurance. Their reliable ratings are based on the G-R 85 years of experience in heat transfer. Their simple design and their sturdy construction, conforming to API-ASME codes, assure dependable operation. They are easy to clean and economical to maintain.

For fuel oil heaters with these important features, investigate the G-R Line.

THE GRISCOM-RUSSELL CO. • MASSILLON, OHIO

G-R HEAT TRANSFER APPARATUS **Fuel Oil Heater**

GR-325

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PARSONS

Parsons regularly engineers and constructs complete units for atmospheric or vacuum distillation, catalytic cracking, catalytic reforming, fluid coking, alkylation, polymerization, desulfurization, lubricant manufacture, product storage and transmission, other process facilities and auxiliaries for the Petroleum Refining Industry.

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BJ MEANS ENGINEERED OIL TOOLS

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LOS ANGELES NEW YORK FORT WORTH HOUSTON

THOMPSON *unitized* VACUUM TANKS for *MODERN* Refineries!

More and more refiners, seeking efficient methods, are using Thompson Unitized Vacuum Tanks. For moving liquids and semi-solids, they're first in the field—with no second!

Jobs which used to require hours now take only minutes. One driver-operator cleans tanks, drainboxes, separator boxes, cooling tower basins, spills, and leaks; unplugs drain lines; transfers acids and caustics; oils roads and tank bunds; sprays weeds. No wonder the Thompson UVT is called "the handiest tool!"

A Thompson Unitized Vacuum Tank will be customized to meet your needs. Capacities range from 20 to 100 bbl. Complete units can be skid, truck, semi-trailer or trailer-mounted. Cost is about what you'd expect to pay for a good new car.

If you are searching for tomorrow's way, you'll want to know more about the modern refinery's handiest tool.

Write today for complete specifications.

This is a 45-bbl. Thompson Unitized Vacuum Tank mounted on a GMC truck. This complete, mobile unit, operated by one man provides speed and economy for a host of liquid and semi-solid handling jobs at the world's most modern refinery.

New model WT50 now available. A complete unit that can be truck-mounted in your own shop. Write for specifications.

THOMPSON TANK and MANUFACTURING CO. Inc.
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SOLE LICENSEE TO MANUFACTURE VACUUM TANKS UNDER U.S. PATENT NO. 2522077

WATER STAYS COOLER...FRESHER...PURER IN Gotkool WATER CANS AND COOLERS

"Gotkool's" exclusive construction keeps water cool, pure and fresh for a long time. Extra wide, snug-fitting, splash-proof top keeps out impurities. Non-leaking, push-button faucets. Ask for "Gotkool," by name at your supply store today.

GOTKOOL WATER COOLER
Made in 2-, 3-, 5-, 8-, 10-, 15- and 20-gallon sizes with extended or recessed push-button faucet optional. *(Note:* 15- and 20-gallon sizes available with extended faucet only.)

GOTKOOL WATER CAN
Made in 1½-, 2-, 3-, 5-, 10-, 15- and 20-gallon sizes without faucets. Extended or recessed push-button faucets available at slight additional cost. *(Note:* 15- and 20-gallon sizes available with extended faucet only.)

KEEP PURE DRINKING WATER ALWAYS HANDY
INSIST ON THE GENUINE . . . Look for the Blue and Black Label With the Name GOTKOOL in Red.

H. P. GOTT MFG. CO.
WINFIELD, KANSAS

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CENTRIFUGAL
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BUILDERS OF OUTSTANDING PUMPS
Since 1869

ESTABLISHED 1869
DEAN BROTHERS PUMPS INC.
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EQUIPMENT MEN . . . in the News

Republic Supply Opens Three New Stores

O. F. REEVES

Republic Supply Co. has opened three new stores during November, according to a recent announcement by M. N. Amsden, vice president in charge of sales. This makes a total of 46 stores and 12 sales offices now in operation.

The new store at Palestine, Tex., is managed by Odie F. Reeves, Jr., formerly field salesman at Shreveport, La.

R. N. GRIFFITH

R. EVANS

The Healdton, Okla., store is managed by R. Neill Griffith, who started as floor man at Nocona, Tex., in 1937, advanced to field salesman and later store manager at that point and also store manager at Elmore City, Okla.

The Lindsay, Okla., store is managed by Richard Evans, Jr., formerly field salesman at Elmore City.

Selas Acquires Assets of Southwest Steel Plate

Selas Corp. of America, heat processing and development engineering firm of Philadelphia, has announced acquisition of the physical assets of Southwest Steel Plate Division, Houston, manufacturer of pressure vessels and mobile compressors.

In announcing the purchase of land, building, and most of the plant equipment of the Houston firm, Frederic O. Hess, president of Selas, further stated that the rapidly expanding chemical and petroleum industries of the southwest have meant an ever increasing market for Selas custom-built heat units to meet the precise and automatic controls these industries need in high-pressure and high-temperature processes. In acquiring facilities of Southwest, Selas has gained 50,000 sq. ft. of manufacturing area for the construction and assembling of fabricated light-and-heavy chemical-control equipment.

The new unit in the Selas expansion program will be known as Selas Constructors, Inc. It will be under the direct management of R. T. Clare, Jr., who will be a vice president and general manager of the company.

Enardo Will Occupy New Office Building

Enardo Manufacturing Co., Tulsa, will move into new offices this month. The building, which has been constructed on the grounds of the plant, will feature a reception room, large working areas, and several executive offices.

Phil B. Drane, president of Enardo, has also announced the opening of a new warehouse in Kilgore, Tex., with sales representatives J. F. Merrill at Henderson, Tex., and K. S. Drane at Houston.

Stewart-Patterson Named As Bowen Representative

James Wilcox, vice president of S. R. Bowen Co., has announced the appointment of Stewart-Patterson Specialty Co., Farmington, N. M., as area agent for Bowen. Beside a complete line of fishing tools, Stewart-Patterson carries a full stock of Bowen sealed-type I rotary jars and safety joints in order to adequately care for the needs of fishing, testing, and coring service companies.

J. O. Tragard Appointed Mason-Neilan Sales Head

J. O. TRAGARD

The appointment of John O. Tragard to sales manager of Mason-Neilan Regulator Co., Ltd., of Canada, has been announced recently by M. F. Peiler, general manager of the Canadian company. For many years Tragard has been connected with the industrial control-equipment field and has previously served in sales executive capacities with Foxboro Co. and Hammel-Dahl Co. His headquarters will be at the Montreal office.

W. F. Wood Made General Manager Of Ric-Wil Co.

W. F. WOOD

William F. Wood has been appointed as general sales manager according to an announcement by Ric-Wil Co., Barberton, Ohio.

Wood was formerly district manager in charge of the Washington, D. C. office and has been with Ric-Wil for the past 16 years. He replaces C. W. Wheeler who is retiring. Ric-Wil Co. is the largest manufacturer of prefabricated insulated piping systems.

Relco Shifts Muncy to Manage Kansas Activities

W. G. MUNCY

The transfer and promotion of W. Glenn Muncy to the position of general manager of all Relco activities in the State of Kansas has been announced by Graham V. Taggart, vice president of Relco Services, Inc. Relco is a specialized organization offering complete engineering services, construction, land-department facilities, and public-relations services throughout the United States.

In assuming his newest position, Muncy will perform his duties out of Relco's Topeka, Kans., offices.

C. G. Stupp Appointed Vice President by Barrett

Appointment of C. G. Stupp to the position of vice president has been announced by T. J. Kinsella, president of Barrett Division, Allied Chemical & Dye Corp.

Stupp has been technical director of Barrett since 1951, during which time the division's research and development activities have doubled. He was first employed by Barrett 38 years ago as a research chemist in the Edgewater, N. J., plant, and has held positions of increasing responsibility in manufacturing and research since then.

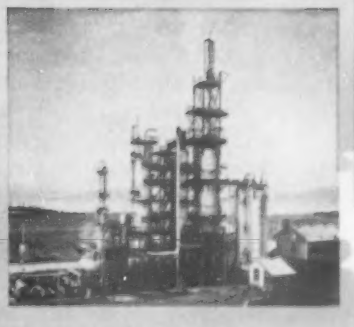
Stupp will continue to head technical activities of the division, including the

another complete refinery . . .

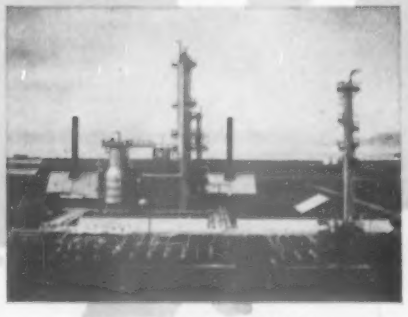
BATANGAS BAY, PHILIPPINE ISLANDS

This new Caltex refinery comprising Crude Distillation, Model IV Fluid Catalytic Cracking, Liquid-Phase Catalytic Polymerization and Propane Decarbonization is now "on stream". It is the

"first in the Philippines"



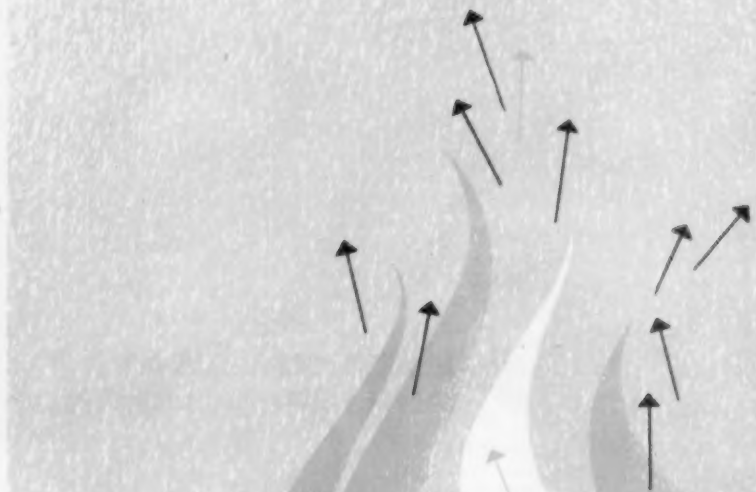
The Model IV Fluid Catalytic Cracking unit



The two-stage Crude Distillation unit

FOSTER WHEELER

165 BROADWAY, NEW YORK 6, NEW YORK



now . . . get good results from poor fuels

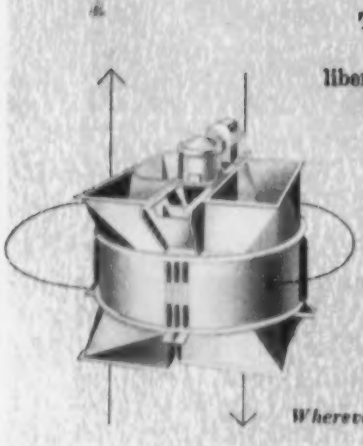
. . . with Ljungstrom Air Preheaters

Use a *Ljungstrom® Air Preheater* on your fuel-fired units, and you'll be able to burn even such former wastes as low-grade tars, pitches and asphalts — *efficiently.*

That's because preheated air leads to efficient combustion by causing faster ignition and a short, hot flame . . . and higher rates of heat liberation. When you preheat your combustion air, excessively lean fuels . . . or fuels with high ash or moisture content — become practical commercial fuels.

And don't forget — using a Ljungstrom means you'll have lower fuel costs . . . greater throughput . . . higher product quality. You'll even be able to design furnaces that cost less initially. Lump these savings together, and you'll find that your Ljungstrom Preheaters *pay for themselves in just a few months.*

So, wherever you are planning a new fuel-fired process unit . . . or modernizing an old one . . . look to Ljungstrom for the practical, modern way to keep costs down. Write today for full information.



Wherever you burn fuel, you need Ljungstrom

The Air Preheater Corporation 60 East 42nd Street, New York 17, N. Y.

research and development department with modern laboratories in Edgewater, Glenolden, Pa., and Toledo, Ohio.

DeLarzelere Heads Akin's L.P.G. Division

DeLARZELERE

Frank P. DeLarzelere of Tulsa, has been placed in charge of the liquified petroleum gas division of Akin Gasoline Co., it has been announced by H. R. Johnson, president of the company. Akin Gasoline has been marketing petroleum products for the past 38 years. The company is supplying butane, propane, or butane-propane mixes on contract basis, as secondary supplier, or on a spot basis.

Before entering the liquified petroleum gas field in 1935, DeLarzelere was with one of the major oil companies for many years.

Catawissa Names Jones As Midwest Division Manager

Nelson A. (Casey) Jones has been appointed Midwest division manager of Catawissa Valve & Fittings Co., Catawissa, Pa., manufacturer of pipe unions and swing-check valves. In his new assignment, Jones will represent the company in the oil fields from headquarters at Irving, Tex.

Jones took his new post after 15 years with the company. For the past 12 years he has served as production manager at the Catawissa plant.

Alco Acquires Central Pipe Fabricating & Supply

American Locomotive Co. has concluded negotiations for the acquisition of the business, plant, machinery, equipment, and inventories of Central Pipe Fabricating & Supply Co., Cincinnati, Ohio, from the joint owners, H. K. Ferguson Co., Cleveland, and Associated Piping & Engineering Co., Compton, Calif.

Perry T. Egbert, Alco president, said that the acquisition was in line with the growth plans of the company, as Alco now would be in a position to offer a full line of prefabricated pipe to its present customers in the chemical, petroleum, and other process fields. Alco's plants in Dunkirk, N. Y., and Beaumont, Tex., now produce heat exchangers, pressure vessels, water pipe, flanges, and allied equipment for these same markets.

The new plant property consists of two buildings on 16½ acres of land 20 miles north of Cincinnati. The plant has a present capacity of approximately 200 tons of prefabricated process and power piping a month, ranging in size from 2½ in. up to 24 in. There is almost unlimited area for expansion in a location situated advantageously for serving chemical, petroleum, and power companies throughout the country.

Egbert stated that Alco is improving and expanding the present plant facilities immediately. Manufacturing space is being greatly increased, machine tools and heat-treating equipment installed, and a railroad siding constructed.

Sinclair Joins Murdock As West Texas Manager

Bruce A. Sinclair has joined Murdock Tank & Manufacturing Co., Tulsa, as West Texas sales and plant manager with headquarters in Odessa, Tex.

Sinclair has been associated with one of the major tank manufacturers in West Texas and New Mexico in the capacity of area sales engineer since 1949.

Murdock Tank & Manufacturing Co.

22 MODELS

NO JOB TOO SMALL . . . NO JOB TOO LARGE FOR A JENSEN!

Here you see 2 of the 22 JENSEN models that insure a unit to fit *your* pumping conditions. Correct speed, stroke and capacity—no wasted power.

There are other factors that have made JENSEN the choice of producers all over the world. For example, the one-man combination counterbalance—heavy welding on base, post and beam—double tapered roller type bearings —precision shaved gears—oil bath lubrication.

For all the facts on the engineering masterpieces incorporated in JENSEN Units, see your JENSEN Dealer or write us at Coffeyville.

JENSEN PUMPING UNITS

JENSEN BROS. MFG. CO., INC.
Coffeyville, Kansas, U.S.A.
Export Office:
50 Church St., New York City

An over-all night view of the modern refinery facilities built by Procon for Ingram Oil and Refining Co. of Meraux, La.

Included in the offsite construction work completed by Procon were dock lines from the storage area of the refinery to the Mississippi River.

Another Modern Refinery Built by PROCON

A completely modern refinery—built by Procon—is now producing high-quality petroleum products for Ingram Oil and Refining Co. at Meraux, La.

Here is another example of how Procon is serving the petroleum refining industry with its planned process construction . . . process construction that is planned so that every requirement will be successfully and economically fulfilled.

Procon's job at the Ingram plant was to install modern refining units, along with the necessary auxiliary facilities. The project was started by dismantling existing equipment. Then a 10,000 B/SD crude topping unit, a 4,000 B/SD UOP Fluid Catalytic Cracker, gas concentration, polymerization, and vacuum units were installed.

In addition to the process units, a considerable amount of offsite construction was completed by Procon, including buildings, steam generation, water supply and disposal systems, loading racks, and dock lines.

The same careful planning that resulted in Ingram's new and modern refinery is available to everyone when they choose Procon. And no matter what the scope of the project may be, construction by Procon means a job well-planned . . . and well-completed.

The polymerization plant is an integral part of the refining facilities built by Procon. Immediately adjacent to these columns will be found the gas concentration plant.

PROCON *Incorporated*

PROCESS CONSTRUCTION

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AFFILIATED COMPANIES

PROCON (CANADA) LIMITED
40 ADVANCE ROAD
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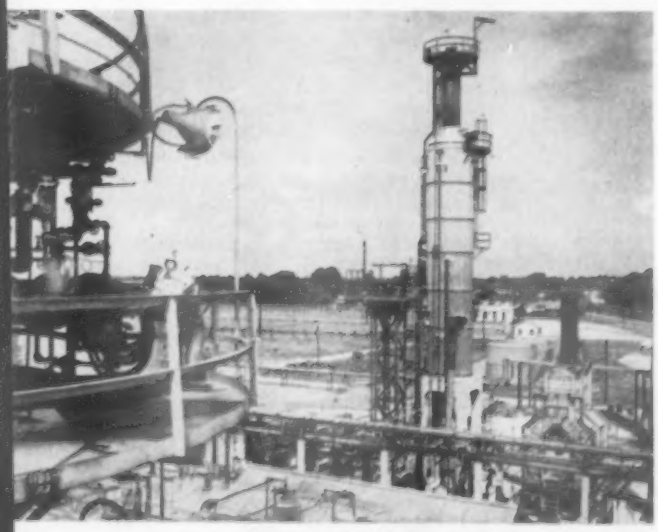
112 STRAND, LONDON, W. C. 2



The vacuum unit tower rises in the background. To the right of the tower can be seen the vacuum heater, and in the foreground, the "cat" cracker.

The UOP Fluid Catalytic Cracking unit as seen from a portion of the large tank farm at the new and modern refinery of Ingram Oil and Refining Co.

is a manufacturer and distributor of oilfield storage tanks, both welded, bolted, and plastic; oil-emulsion treaters; oil and gas separators; water filters; and custom fabricated products.

Birchard Made General Manager, Le Roi Division

The appointment of Paul I. Birchard as vice president and general manager of Westinghouse Air Brake Co.'s Le Roi Division in Milwaukee, Wis., has been announced by Edward O. Boshell, chairman and president of the company.

Birchard will replace Edward J. Green, who has been temporary general manager of Le Roi Division since the resignation of T. O. Liebscher, former president of Le Roi Co.

On October 1, 1954, Le Roi was reorganized as a division of Westinghouse Air Brake. Green will return to Westinghouse Air Brake headquarters in Pittsburgh to resume his position as executive assistant to the president.

For the last 6 years, Birchard, who has some 26 years' experience in the diesel-engine industry, has been vice president and general manager of Enterprise Engine & Machine Co., San Francisco. Before that he was vice president in charge of engineering and manufacturing.

Ostrander is General Sales Manager, Enterprise Engine

OSTRANDER

The appointment of Arthur W. Ostrander to the post of general sales manager of Enterprise Engine & Machinery Division, producers of heavy-duty engines, has been announced in San Francisco by William Clausen, executive vice president of General Metals Corp. and general manager of its Enterprise Engine & Machinery Division.

Ostrander's appointment is an important part of the company's major expansion program which includes the introduction of new engine models in power capacities in excess of 5,000 hp., as well as a major increase in field sales and service personnel.

Ostrander was formerly executive vice president of American Farm Machinery Co., Minneapolis.

Welden Martin Returns to Edmonton for Weatherford

Welden Martin, vice president and general manger of Weatherford, Ltd., has resumed his duties in Edmonton, Alta., Canada, after a 6 months' leave of absence to help conduct sales clinics for all of Weatherford Oil Tool Co.'s branches in the United States.

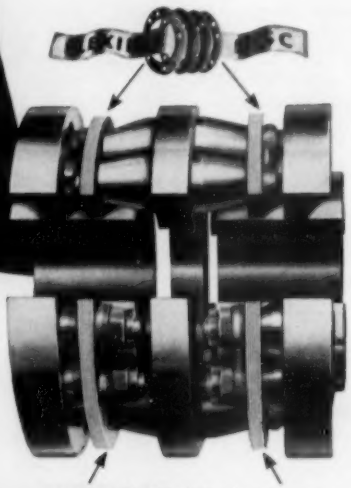
Martin has been with Weatherford since 1952. In January 1953 he was promoted to the position of distribution superintendent. During the summer of 1953 he took advanced training in industrial psychology at the University of Houston, and in October 1953 was elevated to his present position.

P. K. Industries to Make Paul Venturiball Valves

P. K. Industries, Inc., manufacturing engineers, North Arlington, N. J., announces that it has acquired a nonexclusive contract with Paul Valve Corp. for the manufacture and sale of the Paul Venturiball valve.

A merger of operations between several manufacturing and engineering companies that have recently organized under the P. K. name, makes available

Specify THOMAS ALL METAL FLEXIBLE COUPLINGS for Power Transmission to avoid Costly Shut-Downs



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Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes.

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NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
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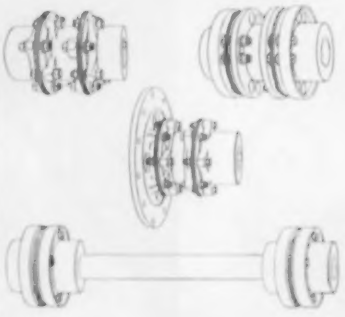
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



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This month's report is on: **2% CR.-MO.**

Has intermediate corrosion resistance in combination with good creep strength and fair resistance to oxidation. For use at temperatures up to 1200° F. in cracking coils, reforming units, heat exchangers, vapor line and hot oil piping, and return-bend forgings for oil heaters.

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Silmo	Sicromo 3	Sicromo 9M	25-12*
DM	4-6% Cr.-Mo.	18-8 Stainless	35-15**
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** Available as seamless tubing on an experimental basis only.*
***Not available as seamless tubing.*

FOR every high temperature application, there's one tube steel that gives you the best life-cost ratio. One steel best answers your particular set of temperature-pressure-corrosion-oxidation conditions. That's why the Timken Company makes the 24 different high temperature steels shown in the box at left.

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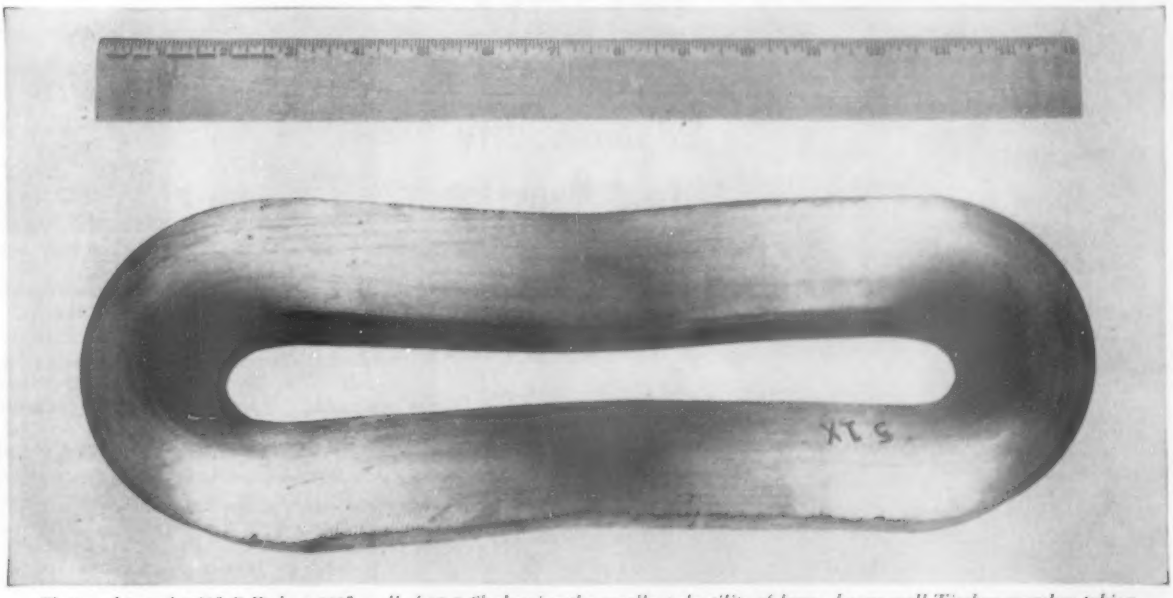

Flattened test of 10½" O.D. by 1.580" wall of 18-8 Cb showing the excellent ductility of large, heavy-wall Timken seamless tubing.

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greatly expanded facilities for the manufacture and sale of Paul Venturiball valves as well as other valves of a specialized nature.

Just recently, a new plant was opened in North Arlington, where the Paul valve will be manufactured and sold under the P. K. label. The company plans to specialize in the design and application of this equipment to the industrial process and power industries and will emphasize the use of these valves in the more severe automatic control and manual shutoff applications where high pressures, temperatures, and erosion problems are difficult.

Smith Is Chief Engineer For Petroleum Specialties

W. S. SMITH

W. S. Smith has been appointed as chief engineer for Petroleum Maintenance Co., Long Beach, Calif., according to an announcement by W. A. Thompson, Jr., general partner and manager of that firm. In this capacity Smith will not only be directly responsible for sales engineering and personnel relations, but he will also act as administrative assistant to Thompson.

During the past 31 years, Smith has held responsible positions which embraced all phases of the work he will direct in his capacity as chief engineer of Petroleum Maintenance Co. Before joining Pemco, Smith was with Wilshire Oil Co., Inc.

Rayonier Names Two Agents To Distribute Rayflo

Rayonier, Inc., has appointed Milwhite Mud Sales Co., Houston and Macco Corp., Paramount, Calif., to distributors for its new product, Rayflo, which is a domestic dispersant for oil-well drilling muds.

Milwhite will distribute to all major drilling areas in the United States, except California, which will primarily be served by Macco.

Weatherford Promotes T. B. Antrim To Division Manager

T. B. ANTRIM

F. A. DUNIGAN

Todd B. Antrim has been promoted from district manager of Weatherford Oil Tool Co.'s Odessa, Tex., branch to division manager of West Central Texas and New Mexico, it has been announced by Jess E. Hall, Jr., president of the firm. At the same time he also announced the creation of a new public relations and advertising department to be handled out of Weatherford's main sales office in Houston, with Frank A. Dunigan, Jr. appointed as manager and Robert K. Hoague as assistant manager.

Antrim has been with Weatherford since 1948. Prior to that time he was superintendent for Coalinga Machine Works in Coalinga, Calif. Antrim will remain in Odessa which will be the headquarters for his division.

Dunigan has been with the company since January 1954. He started in the Houston district as salesman, and advanced to assistant division manager of South Texas in June.

Hoague joined the firm in November 1953, and prior to this appointment was in city sales at Weatherford's Tulsa office. Formerly he was project engineer with Lone Star Steel Co. near Longview, Tex.

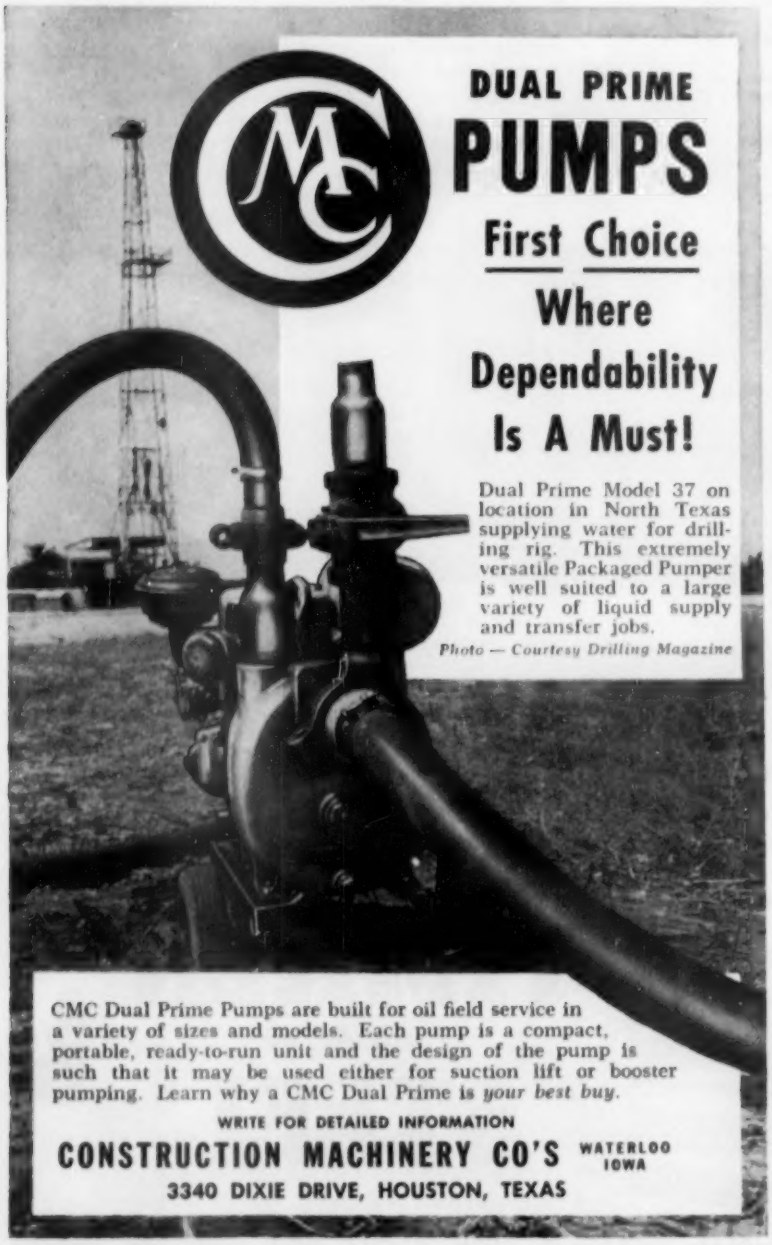
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Photo — Courtesy Drilling Magazine
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6. **If free water not a problem the expansion vessel can be installed without first stage—resulting in very inexpensive cold separator.**
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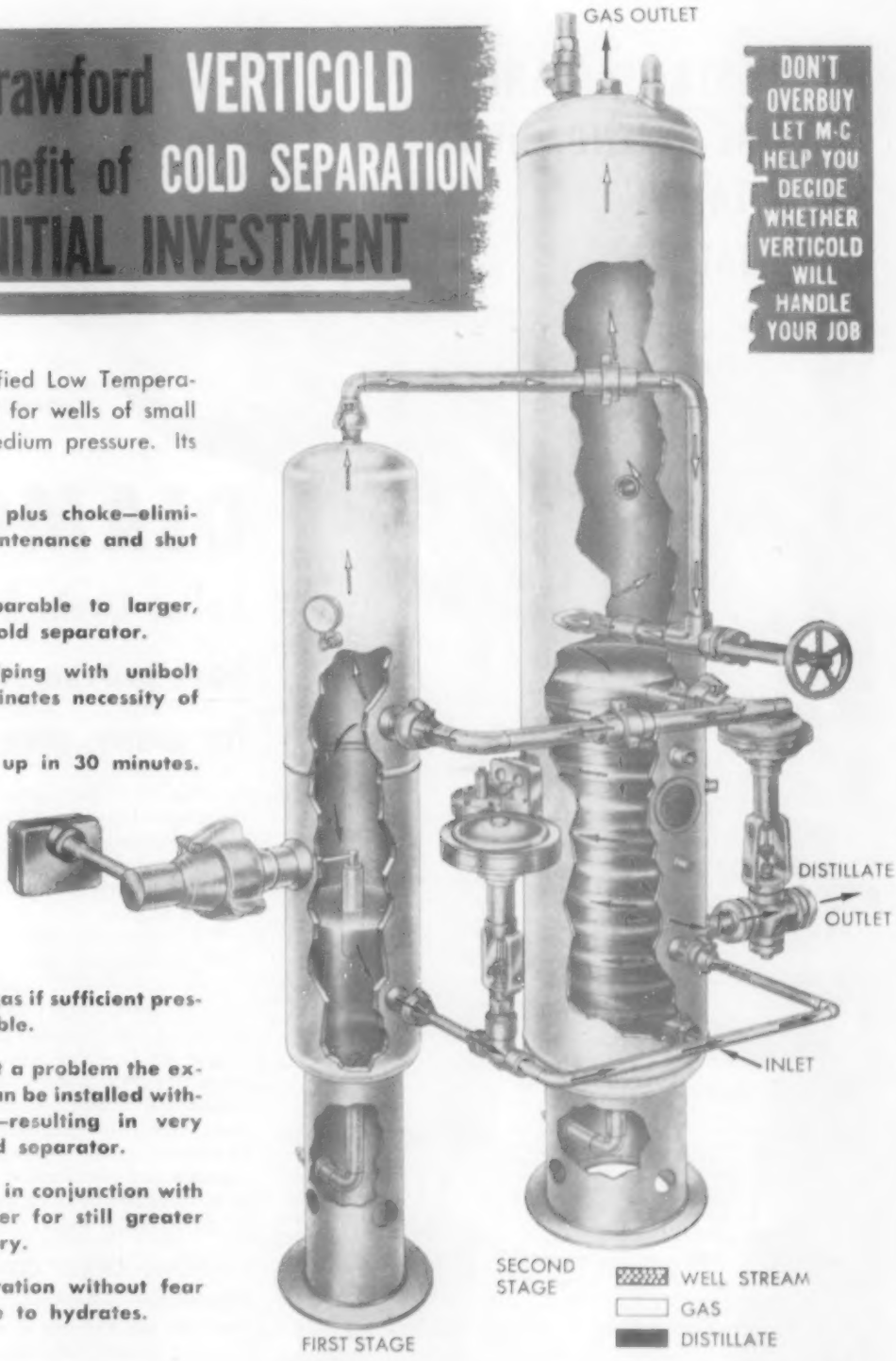

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EXPLORATION

The Booming Strat Search

by Norman S. Morrisey

PRODUCTION from stratigraphic traps dominates the United States development program and is perhaps the most important source of new oil on the entire North American Continent.

Exploration personnel have long been faced with a tremendous problem in finding new reserves. Seismic prospects are harder to find today than they were 15 years ago. Reflection seismic work is almost in the position of refraction shooting during the late twenties and early thirties—the easy fields have been discovered.

Increased subsurface control makes strat plays easier to find and in most areas it is possible to extend the trends once the type of trap is recognized. In the past, many of these stratigraphic fields were accidentally stumbled upon. East Texas is a classic example. Now, however, some of these plays are recognized and forecast months or even years ahead of known production.

Two main types . . . The term stratigraphic trap is somewhat misleading, as many strat traps are formed by changes in porosity or permeability of the reservoir plus structural movement. Strat traps fall in two principal classes:

1. Traps formed during or shortly after deposition, such as sand bars, deltas, shoreline pinchouts (Fig. 1a).

2. Traps formed by erosion at an unconformity and subsequent sealing of the reservoir by later deposition, as in East Texas (Fig. 1b).

Pembina, in Alberta, Canada, is an excellent example of a sand pinchout. Fields like this normally extend for many miles, although the actual producing zone may be fairly narrow. Already Cardium sand production at Pembina covers over a quarter of a million acres.

Cotton Valley sands pinch out along old shorelines in North Louisiana and are responsible for much of the rich gas-distillate production at Cotton Valley, Hico-Knowles, Ruston, and Unionville.

In the Rocky Mountains, sand pinchouts and porosity changes form the reservoirs in most of the important producing areas that are now being developed. The Williston basin is the only province where this type of production is taking a back seat. Stratigraphic rather than structural conditions control production at Weston County, Wyoming, the Denver-Julesburg basin, and the San Juan basin.

West Texas and the Gulf Coast are two notable exceptions where structure is still the main factor governing production. On the Gulf Coast, however, sand pinchouts are increasing in importance. Flank production in several fields is caused by sand development rather than structure.

How these traps are found . . . Regional geology, detailed stratigraphy, and exploratory tests are the keys to finding stratigraphic traps. The role of geophysics is only secondary as many of the fields show little or no closure. In some instances, seismic work can show areas of thickening or thinning and at times can map marked unconformities.

Geologists use detailed lithologic studies, isopach, subcrop, and lithofacies maps, and cross-sections in locating stratigraphic traps. The time spent on sample running and subsurface geology is repaid a thousandfold with the first successful wildcat.

Wildcat tests and strat tests or core holes are the final answer in locating these prolific fields. Many companies have slim-hole programs now under way and are planning to continue this work. Operators trade information on their wells because in many areas these wells are classified as confidential and well information is not released directly through the usual channels. Swapping core-hole data is an inexpensive way of gaining subsurface control, as an operator can get information on several holes by judicious trading with his own information. In some instances one strat hole actually is worth four to six holes. This trading of information means a tremendous reduction in exploration costs to the individual company or operator.

Geologist's role important . . . Subsurface geology is an economical method of forecasting stratigraphic plays, because 10 to 15 geologists can be hired for the cost of one seismic crew. This emphasizes the importance of the geologist in the exploration picture. Independents and small operators can successfully compete with the major oil companies in this type of exploration, because the overhead is relatively low.

An active seismic exploration program that requires several crews can cost $50,000-$100,000 per month, exclusive of leasing or well costs. The same money spent on stratigraphic plays will cover the cost of the subsurface geological work, the leasing, and may even pay for an exploratory test.

Stratigraphic plays will continue to dominate the United States exploration and drilling programs for many years to come, because these prospects are easier to find as subsurface control increases.

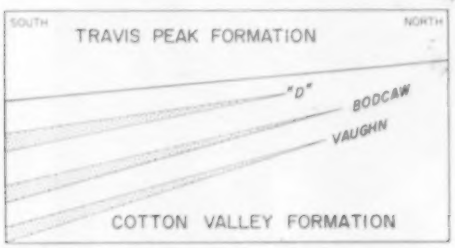

Fig. 1a (left)—Cotton Valley sands pinch out and produce along the "fairway" in North Louisiana.

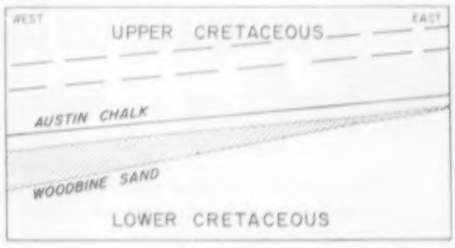

Fig. 1b (right)—East Texas, largest oil field in the world, is a classic example of a stratigraphic trap.

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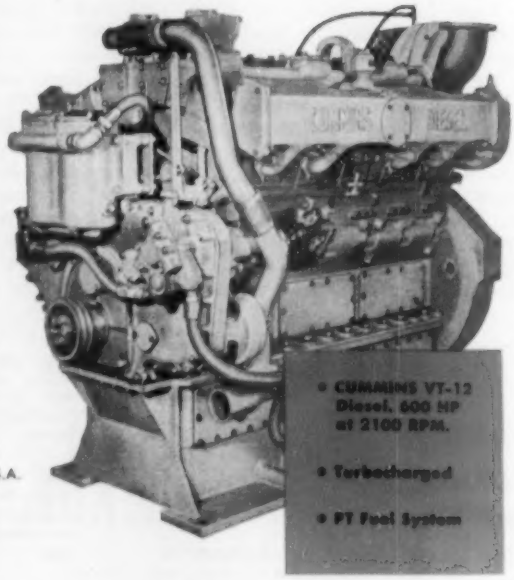
Write for PT Bulletin, and data on Cummins Diesels for oil field service, motor trucks and other industrial applications.



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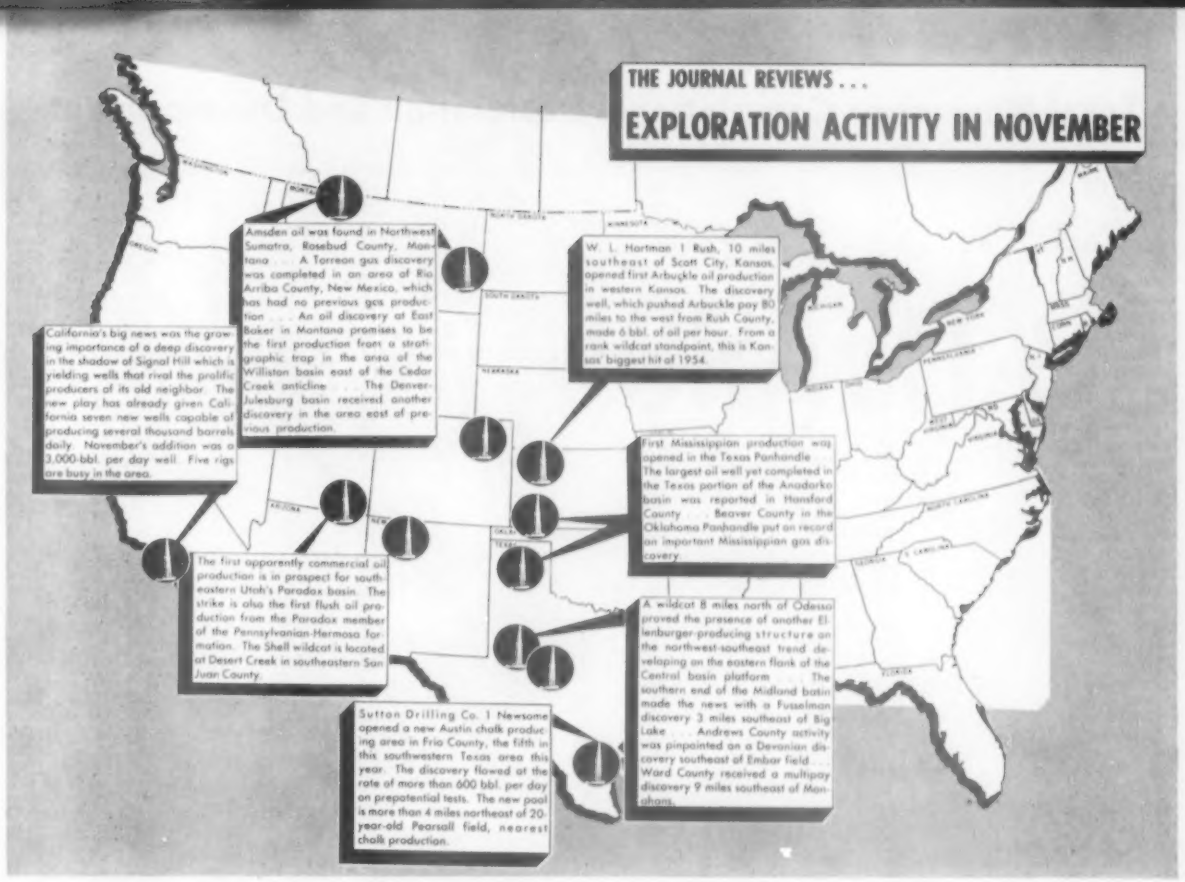
THE JOURNAL REVIEWS . . .
EXPLORATION ACTIVITY IN NOVEMBER
Amsden oil was found in Northwest Sumatra, Rosebud County, Montana . . . A Torrean gas discovery was completed in an area of Rio Arriba County, New Mexico, which has had no previous gas production . . . An oil discovery at East Baker in Montana promises to be the first production from a stratigraphic trap in the area of the Williston basin east of the Cedar Creek anticline . . . The Denver-Julesburg basin received another discovery in the area east of previous production.
W. L. Hartman 1 Rush, 10 miles southeast of Scott City, Kansas, opened first Arbuckle oil production in western Kansas. The discovery well, which pushed Arbuckle pay 80 miles to the west from Rush County, made 6 bbl. of oil per hour. From a rank wildcat standpoint, this is Kansas' biggest hit of 1954.
California's big news was the growing importance of a deep discovery in the shadow of Signal Hill which is yielding wells that rival the prolific producers of its old neighbor. The new play has already given California seven new wells capable of producing several thousand barrels daily. November's addition was a 3,000-bbl. per day well. Five rigs are busy in the area.
First Mississippian production was opened in the Texas Panhandle . . . The largest oil well yet completed in the Texas portion of the Anadarko basin was reported in Hansford County . . . Beaver County in the Oklahoma Panhandle put on record an important Mississippian gas discovery.
The first apparently commercial oil production is in prospect for southeastern Utah's Paradox basin. The strike is also the first flush oil production from the Paradox member of the Pennsylvanian-Hermosa formation. The Shell wildcat is located at Desert Creek in southeastern San Juan County.
A wildcat 8 miles north of Odessa proved the presence of another Ellenburger-producing structure on the northwest-southeast trend developing on the eastern flank of the Central basin platform . . . The southern end of the Midland basin made the news with a Fusselman discovery 3 miles southeast of Big Lake . . . Andrews County activity was pinpointed on a Devonian discovery southeast of Embar field . . . Ward County received a multipay discovery 9 miles southeast of Monahans.
Sutton Drilling Co. 1 Newsome opened a new Austin chalk producing area in Frio County, the fifth in this southwestern Texas area this year. The discovery flowed at the rate of more than 600 bbl. per day on prepotential tests. The new pool is more than 4 miles northeast of 20-year-old Pearsall field, nearest chalk production.

November Adds New Oil Basin

Utah's Paradox second oil-producing basin to enter production column in fall of 1954

by John C. McCaslin

EACH month of this exciting exploratory year has had its new basins, biggest wells, new oil-producing states, and rank new pays. November was certainly no exception, coming up with everything but the new producing state. The month's many big wildcat stories were overshadowed by the first apparently commercial oil production in Utah's Paradox basin.

1954 . . . Two New Oil Basins

One of the biggest stories to come out of a busy year for the industry is the debut of two new oil-producing basins. Earlier in the autumn Texas' Dalhart basin entered the production column. In November it was southeastern Utah's Paradox basin, a salt basin, similar to the Permian basin. For awhile it seemed that even a third basin might crowd in, but Continental Oil Co.'s Raton basin test in New Mexico didn't quite make the grade.

The Paradox opener was Shell Oil Co.'s 2 Desert Creek, 8 miles northeast of Boundary Butte in southeastern San Juan County. At month's end the November highlight was testing after flowing at the rate of 1,150 bbl. of oil per day through 74/64-in. choke from perforations in the Paradox.

This rather extensive evaporite basin has had some previous noncommercial oil and gas production, but the Desert Creek hit is the first real encouragement. It lies but 13 miles northwest of Shell's recent Arizona success at East Boundary Butte. Shell seems to have given the green light to future deep exploration in a whole new province of the Four Corners region.

West Texas Takes Big Stride

It was just another big, busy, and productive month for West Texas. The fast-growing Ellenburger trend on the eastern flank of the Central Basin Platform added another link.

The Texas Co. 1 Salle Ratliff, 8 miles north of Odessa, is the latest impetus to the trend's growth. The wildcat flowed 508 bbl. of oil per day on completion. This well is the first link between Headlee and similar production in Midland Farms, 16 miles northwest.

Silurian strike . . . Near Big Lake, The Texas Co. 1 Young, first planned as an Ellenburger test, was completed as a 1,669-bbl. Fusselman discovery. The new pool is in an area of little 1954 exploration. The sudden completion helped turn West Texas eyes away from the big Midland-Ector play.

Andrews . . . Phillips Petroleum Co. discovered Devonian production in the southern part of this county by redrilling an old failure which had previously tested only through Middle Permian beds.

The 3-B Embar flowed 975 bbl. of oil daily on recompletion test. Nearest Devonian production is about 5 miles to the west in Block 11 field.

Ward multipay hit . . . British-American Oil Producing Co. 1 Tubb, Ellen-

Total November Completions, Exploration and Development

	Total comp.	Oil	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	Over 12,500 ft.	Total footage	Active operations
Ala.-Ga.-Fla.	7	0	0	7	3	1	3	0	0	0	26,115	8
Arkansas	56	31	0	25	7	27	22	0	0	0	229,465	55
California	197	150	3	44	49	75	48	14	10	1	866,663	223
Colorado	121	34	7	80	3	31	84	3	0	0	648,322	110
Illinois	262	138	0	124	131	131	0	0	0	0	612,581	534
Indiana	123	24	2	97	102	21	0	0	0	0	188,311	80
Kansas	431	236	40	155	32	385	14	0	0	0	1,532,875	447
Kentucky	117	39	15	63	84	33	0	0	0	0	207,761	134
Louisiana	293	169	30	94	108	22	45	45	41	32	1,927,600	451
North	168	97	13	58	108	18	32	8	2	0	522,817	177
South	125	72	17	36	0	4	13	37	39	32	1,404,783	274
Michigan	54	20	4	30	25	24	5	0	0	0	160,981	139
Mississippi	39	13	0	26	0	7	16	8	7	1	301,148	54
Montana	41	21	3	17	15	13	7	5	1	0	171,356	70
Nebraska	27	7	1	19	1	4	22	0	0	0	153,458	58
New Mexico	99	50	32	17	9	43	27	9	4	7	533,639	113
Northwest	36	0	30	6	7	8	18	3	0	0	169,976	18
Southeast	63	50	2	11	2	35	9	6	4	7	363,663	95
New York	19	10	0	9	18	1	0	0	0	0	29,868	24
North Dakota	26	13	0	13	0	4	3	16	3	0	204,191	37
Ohio	94	31	27	36	51	43	0	0	0	0	204,919	188
Oklahoma	663	390	25	248	267	260	98	25	12	1	2,279,689	1,060
Pennsylvania	133	33	40	60	107	11	13	2	0	0	323,889	94
South Dakota	3	0	0	3	1	1	1	0	0	0	7,983	3
Texas	1,508	931	51	526	463	508	331	149	32	25	6,493,079	1,297
North Central	608	360	7	241	313	206	80	9	0	0	1,798,694	318
West	368	296	3	69	44	149	87	50	16	22	1,982,800	455
Panhandle	60	42	14	4	7	44	3	4	1	1	196,364	50
East	104	48	12	44	8	40	44	12	0	0	563,147	102
Gulf Coast	198	102	10	86	16	32	76	61	11	2	1,293,986	183
Southwest	170	83	5	82	75	37	41	13	4	0	658,088	189
Utah	6	0	0	6	4	1	1	0	0	0	14,171	35
West Virginia	61	3	47	11	32	27	2	0	0	0	172,128	180
Wyoming	70	36	1	33	6	21	24	16	3	0	410,952	178
Miscellaneous	¶5	0	0	5	1	4	0	0	0	0	8,398	§6
Total November 1954	4,455	†2,379	328	*1,748	1,519	1,698	766	292	113	67	17,709,542	‡5,578
Total October 1954	4,407	2,370	331	1,706	1,431	1,776	738	283	125	54	17,576,010	5,243
Cumulative 1954	48,914	27,030	3,622	18,262	15,473	19,119	8,876	3,496	1,394	556	198,851,510	
Cumulative 1953	45,089	23,509	3,524	18,056	13,905	18,325	7,953	3,228	1,277	401	182,505,844	
Western Canada	235	138	12	85	47	111	69	5	3	0	938,147	
Alberta	123	74	8	41	9	45	61	5	3	0	594,210	
Saskatchewan	76	38	3	35	19	50	7	0	0	0	251,215	
Manitoba	35	26	0	9	19	16	0	0	0	0	85,833	
B.C.-N.W.T.	1	0	1	0	0	0	1	0	0	0	6,889	
Cumulative 1954	1,962	1,121	145	696	444	917	504	82	13	2	7,809,875	

*Incl. 82 service wells: N. Y. 8, Ohio 7, Okla. 37, Pa. 26, Tex. Panhandle 1, Iowa 3. †Incl. 48 cond. wells: S. La. 10, Miss. 1, S.E. N. M. 1, Okla. 12, W. Tex. 1, Tex. Panhandle 1, E. Tex. 8, Gulf Coast Tex. 5, S.W. Tex. 9. ‡Incl. all wells rigged up and/or drilling at month's end. §Incl. Ore. 1, Wash. 1, Nev. 4. ¶Incl. Iowa 3, Mo. 1, Wash. 1.

. . . and the Month's Wildcats

	Total	Oil	Gas	Dry	Footage	1954 Comp.	1954 (1,000 ft.)	1953 Comp.	1953 (1,000 ft.)
Alabama-Georgia-Florida	6	0	0	6	22,255	91	491	105	577
Arkansas	11	2	0	9	50,070	136	552	130	465
California	42	5	1	36	186,863	529	2,538	601	2,865
Colorado	66	4	2	60	367,663	564	3,129	325	1,721
Tri-States	133	7	0	126	229,693	759	1,438	929	1,804
Kansas	111	45	13	53	427,470	715	2,813	821	3,124
Louisiana	54	7	8	39	463,182	513	4,640	474	4,154
North	25	0	3	22	130,762	182	1,026	165	959
South	29	7	5	17	332,420	331	3,614	309	3,195
Michigan	26	1	0	25	78,688	218	524	261	647
Mississippi	17	0	0	17	100,827	158	1,073	191	1,350
Nebraska	12	2	0	10	72,508	154	820	144	730
New Mexico	16	4	1	11	104,190	141	985	160	1,080
North Dakota	11	1	0	10	76,046	107	578	80	416
Oklahoma	80	13	2	65	321,328	764	3,277	691	3,040
South Dakota	3	0	0	3	7,983	21	96	19	98
Texas	385	62	7	316	1,854,910	4,759	23,443	4,836	23,806
North Central	173	33	2	138	586,054	1,929	6,667	1,956	7,029
West	52	14	2	36	351,228	872	5,300	804	4,828
Panhandle	4	2	0	2	23,674	89	511	23	124
East	31	0	1	30	168,479	300	1,578	271	1,375
Gulf Coast	59	7	0	52	459,020	763	5,661	809	5,777
Southwest	66	6	2	58	266,455	806	3,726	973	4,673
Utah-Wyo.-Mont.	43	4	1	38	216,025	398	2,178	311	1,756
Others	16	0	3	13	84,719	143	648	94	373
Total November 1954	1,032	157	38	837	4,674,420	10,170	49,223	10,172	48,006
Total October 1954	914	115	32	767	4,387,967				
Cumulative 1954	10,170	1,444	359	8,367	49,223,119	10,170	49,223		
Cumulative 1953	10,172	1,450	346	8,376	48,005,780			10,172	48,006
Western Canada	90	13	7	70	375,677				
Cumulative 1954	691	91	64	536	2,919,661				

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burger discovery 14 miles southeast of Monahans, was completed for a daily flowing potential of 312 bbl. The well also indicated production in the San Andres, Glorieta, Fusselman, and Waddell sand.

More Stars for Hugoton

The Hugoton embayment is nearing the end of its most significant year since the Borger days of the Texas Panhandle. A month of many developments was climaxed by the opening of first Mississippian production in the Texas Panhandle.

Humble Oil & Refining Co. 1 Oil Development Co. of Texas, 5 miles north of Spearman in busy Hansford County, had a calculated open flow of 1,500 M.c.f. of gas per day from the Chester. The new discovery adds further excitement to the wildcat spree which has been going full blast this year, opening up new pre-Permian producing areas by the numbers.

A big one . . . A 1,296-bbl. per day confirmation well in Hansford County became the biggest oil producer yet completed in the Texas part of the vast Anadarko basin.

R. H. Fulton completed 2 Lasater, 9 miles northeast of Spearman, in the Atoka-Pennsylvanian sand. The prolific well is the southwest offset to the 1 Lasater, a 498-bbl. per day discovery.

Beaver County back . . . An important Mississippian gas discovery was completed in the Oklahoma Panhandle.

United Producing Co. 1 Evans, ½ mile north of Mocane, had a calculated open flow of 20,200 M.c.f. of gas per day from the Chester. The strike is 5 miles northeast of Southwest Mocane field.

Strat-Trap Oil in Williston

Monoco Oil Co. reported an initial pump and flow at the rate of 495 bbl. of oil daily at 1 Ferguson-Goldin, East Baker wildcat in Fallon County, Montana. The Red River-Ordovician discovery is possibly the first production from a stratigraphic trap in the area of the Williston basin east of the Cedar Creek anticline.

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Exploration Highlights

PACIFIC COAST

CALIFORNIA

Eocene Test for Strand

Shell Oil Co. was preparing location for a 15,000-ft. Eocene test near Strand field, central San Joaquin Valley. Site is in NE NE 12-30s-25e, on a 2,000-acre block the operator recently leased from Kern County Land Co. Its objective will be Eocene production, expected about 7,000 ft. below the 8,000-ft. Stevens (Miocene) sand being produced at Strand.

New Dagany Gap Pool

Gilliland Oil Co. 1 Barker opened a new fault block pool about ¼ mile west of production in the Dagany Gap area of Pyramid Hills, Kern County. It was completed flowing 360 bbl. of 40°-gravity crude through a 24/64-in. choke, with 111 ft. of perforations at intervals between 1,858-2,150 ft. Location is in SE SW 3-25s-18e.

Sunset Beach Stepout

What is believed to be a new fault-block pool was discovered by W. L. Meeker 1 Lomita Land in the Sunset Beach area of Orange County. The test, about ¼ mile northeast of Atlantic Oil Co.'s recent completion and more than ½ mile southeast of Burn Aston's Lo-

It's a long, long way from the bottom of a surveying party to the top man position. However, B. B. Robinson, Jr., like so many other IX personnel, started as a surveyor with a party over 20 years ago . . . worked up through the jobs of observer, computer, and party chief to his present position of supervisor and manager of IX's Fort Worth office.

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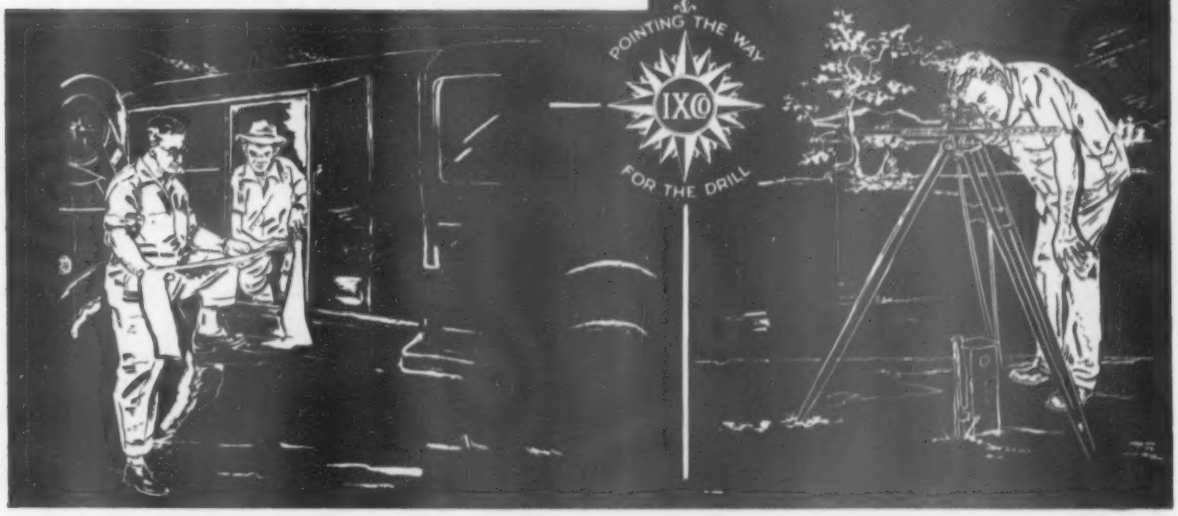

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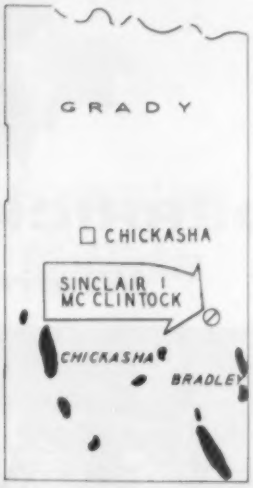
mita discovery well, flowed at a 35-bbl. hourly rate through a 16/64-in. choke. Production was from 70 ft. of sand between 7,900 and 8,000 ft. Location of the successful test is in NE SW 20-5s-11w.

MID-CONTINENT

OKLAHOMA

Springer Discovery in Grady Reports Tests

A deep wildcat discovery in Grady County, southern Oklahoma, flowed 165 bbl. of load oil and 93 bbl. of new



A flow-test of the Cunningham sand (Springer) was reported at Sinclair Oil & Gas Co. 1 McClintock, northwest of Bradley in Grady County, Oklahoma.

oil on a 16-hour test of perforations at 11,717-85 ft.

Sinclair Oil & Gas Co. et al 1 McClintock, NE SW SE 8-5n-5w, reported gas volume of 5,220 M.c.f. per day with tubing pressure of 3,050 psi.

Bradley townsite . . . Phillips Petroleum Co. has reported a high flow capacity at a development well in this area.

The 1 Sterr, NE SW 25-5n-5w, flowed 225 bbl. of oil in 20 hours on 16/64-in. choke from Bromide (first and second) sand perforations at 12,096-12,266 ft., and 12,293-12,351 ft. The well flowed 113 bbl. of oil in 24 hours through 16/64-in. choke from lower sands in the Bromide through perforations at 12,410 to 13,312 ft.

Garvin County's Brady Area Extended in Two Directions

James B. Kite 1 Carlisle, NE NW SE 24-2n-1w, flowed 121 bbl. of oil per day on ⅛-in. choke natural from

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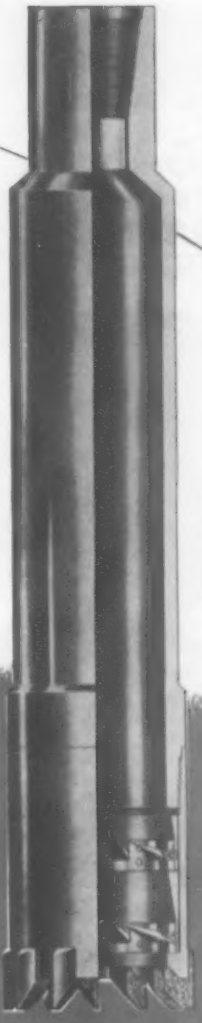

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first Deese perforations at 4,507-22 ft. to extend Garvin County's Brady area.

Kirkpatrick Oil Co. 1 Ohio, SE NW NE 23-2n-1w, flowed 168 bbl. per day on 12/64-in. choke from perforations at 4,780-90 ft. to extend the field in the other direction. Jordan Petroleum Corp. has a well under way at 1 McClain in SW NW SE 24; Burton-Price Industries 2 Damron, NW SE NE 23, is beginning operations.

More Sand Cored at Sinclair Et al 1 Griffin in Marshall

More indicated Oil Creek sand oil pay has been reported at Sinclair Oil & Gas Co. et al 1 Griffin, significant multi-zone discovery in Marshall County on the Madill-Aylesworth anticline.

The well flowed 3,126 M.c.f. of gas with more than 5 bbl. of distillate per hour after open hole testing at 7,524-51 ft. A core was then taken from 7,551-86 ft. getting 28 ft. and 9 in. of sand with good porosity and stain.

Bartlesville Sand Pay Extended at Edmond

Powell Briscoe, Inc. has extended Bartlesville sand production ⅝ mile southeast of nearest producers in Oklahoma County's Edmond area.

The 1 Moy, C SE SW 29-14n-3w, flowed 5 to 6 bbl. of new oil hourly through open tubing from perforations at 6,264-86 ft. after fracture treatment.

KANSAS

Pipe Set to Test New Ellis County Prospect

Ellis County has a new prospective Arbuckle discovery well. It is Leben Oil Co. 1 Dinkel, SE SE NW 16-14s-17w.

The firm has cemented 5-in. pipe at 3,508 ft. to test Arbuckle oil shows. Recovery on a drill-stem test at 3,504-08 ft. was 208 ft. of clean oil and 300 ft. of gas. The Arbuckle top was at 3,501 ft. (—1,512 ft.).

The Ellis prospect is located 1 mile southeast of Younger South field production.

Barber County Wildcat Set For Tests in Mississippian

Five-inch pipe has been set at 4,460 ft. at Jones, Shelburne & Farmer's 1 McKeever, SE SE SE 13-32s-10w, Barber County wildcat.

Recovery on a Mississippian drill-stem test at 4,350-70 ft. was 4,250 ft. of clean oil, 60 ft. of water. This prospective pool-opener is located about 5

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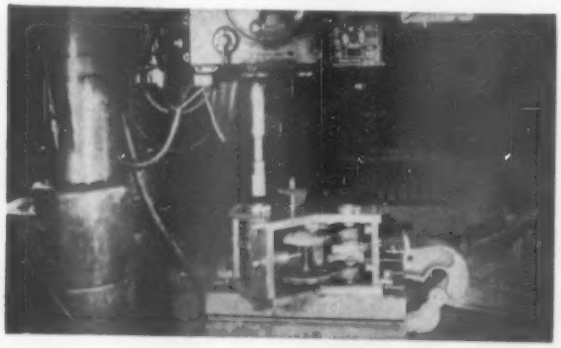

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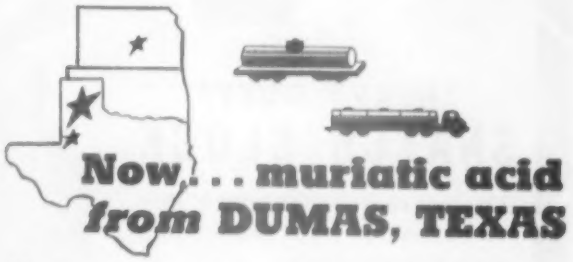

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miles southwest of new Dusenberry field in Harper County.

Good Swab Test Reported At Ellsworth Producer

The Texas Co. 1 Urbanek, NW NW NE 15-16s-10w, Ellsworth County, swabbed 46 bbl. of oil in 30 minutes from perforations in the Arbuckle at 3,413-18 ft.

The new oil well is located 1 mile east of Stoltenberg field production. Pumping equipment is being installed by The Texas Co.

HUGOTON EMBAYMENT

WESTERN KANSAS

Western Hamilton County Wildcat Finds Penn Oil

Pennsylvanian oil is indicated at a wildcat in far western Kansas' Hamilton County. The indicated prospect is 4 miles east of the Colorado border, 40 miles southeast of Lamar, Colo.

United Producing Co. 1 Helfrick, SE SE SE 6-25s-42w, recovered 110 ft.

Pennsylvanian oil recovered at Hamilton County wildcat in far western Kansas.

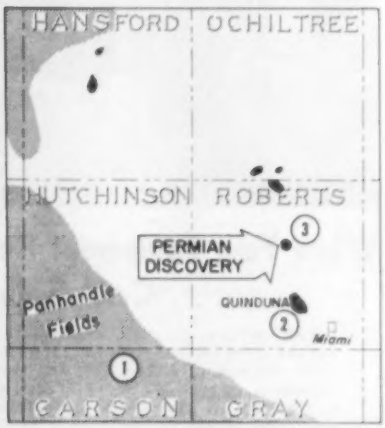
of free oil, 110 ft. of slightly mud-cut and heavily gas-cut oil, and 110 ft. of heavily oil and gas-cut mud on test of the zone 5,037-46 ft. Elevation of the wildcat is 3,604 ft. with top of Cherokee or Morrow(?) reported at 5,036 ft.

The indicated discovery, which would open first oil production in the area, is 12 miles northwest of Hugoton field gas production. Closest oil production is at Greenwood field, 40 miles south.

TEXAS PANHANDLE

Texas Panhandle Area Has New Permian Field

The third Permian-producing area for the Panhandle has been established in Roberts County, Texas. Cree Drilling Co. completed 1 Flowers-Shell-Flowers as a shut-in gas discovery.



Cree Drilling Co. established the third Permian producing area in the Texas Panhandle at 1 Flowers-Shell-Flowers, 18 miles northwest of Miami.

The two Permian areas in Texas' Panhandle are Panhandle field and Quinduno field.

The new discovery, located in Section 75, Block C, G&M Survey, made an open flow potential gage of 11,000 M.c.f. per day. The strike is 9 miles

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north of Quinduno field production (Permian brown dolomite), and 23 miles northwest of brown dolomite production in Hugoton-Panhandle field.

The wildcat discovery is 15 miles south and 30 miles east of North Hutchinson-Pennsylvanian field where Permian production has been indicated at The Texas Co. 1 Buchner, 10 miles south of Hansford. A drill-stem test at 3,420-3,510 ft. in the Permian white dolomite surfaced gas in 4 minutes at 2,800 M.c.f. per day. The Texas Co. 1 Harbour, 11 miles south of Hansford, ran a 30-minute drill-stem test at 3,460-96 ft., getting gas in 3 minutes at 1,860 M.c.f. per day.

Confirmation Reported at Ochiltree Discovery Area

The Texas Co. has confirmed a dual gas discovery in southwestern Ochiltree County. The 1 Sophie Pearson Daniel "C," 8 miles southeast of Waka and ½ mile northeast of the field discovery well, 1 Daniel "A," got 1,670 M.c.f. of gas per day on drill-stem test in the Atoka at 7,347-87 ft.

The discovery well in the field was a dual gas strike with Atoka and Morrow sand production.

OKLAHOMA PANHANDLE

Morrow Discovery is Finaled in Beaver

United Producing Co. 2 Evans, SW NE 18-5n-25eCM, flowed 4,400 M.c.f. of gas per day after acidization and fracturing to become a new Morrow gas area in Beaver County. It is 1 mile southwest of the 1 Evans, a Chester-Mississippian discovery.

WEST TEXAS-NEW MEXICO

WEST TEXAS

Pecos County Gains Another Deep Exploration

Hunt Oil Co. has staked location for an 18,000-ft. wildcat approximately 20 miles south of Fort Stockton. The new well has been designated 48 Elsinore Royalty Co. and is in Section 51, Block D, GC&SF Survey.

Hunt 47 Elsinore, 13 miles to the northwest of the new project, was drilling below 17,585 ft. in lime and shale at this report. Formation tops and tests, if any, have not been reported. No. 47 Elsinore was originally scheduled to around 17,000 ft., and is on a location previously drilled to 2,005 ft.

● Gulf Oil Corp. 1 Northrup, Delaware basin wildcat and present depth

record holder for Texas, is still an active well, with total depth at 18,609 ft. Operators ran into trouble with junk in the hole and had to sidetrack around it. Total depth in the whipstocked hole was 18,609 ft. Drill-stem tests around 18,544-18,609 ft., open 7 minutes, unloaded water blanket and mud, with no shows.

Midland County . . . Phillips Petroleum Co. 1-A Parks, on the extreme northern end of Virey field, found no shows on a drill-stem test of the Devonian and continued drilling.

Sample top on the Devonian was 11,700 ft. The test was run from 11,700-11,861 ft. and 30-minute recovery in the pipe was 95 ft. of mud with no shows.

SOUTHEAST NEW MEXICO

Lea County Strike Finaled, Another Contracted

Lea County wildcatters completed one Devonian discovery the past week, south of Cross Roads field, and made location for a Devonian exploration 2 miles south of Anderson Ranch field.

Texas Pacific Coal & Oil Co. 1 South Cross Roads Unit, in 10-10s-36e, was completed for a daily potential of 300 bbl. of 42° oil, flowing through 16/64-in. choke. Pay section was perforated between 12,254-92 ft. Tubing pressure was 150 psi., and gas-oil ratio was almost zero.

The new operation, contracted to 13,500 ft., will be Continental Oil Co. 1 Williams Ranch, located in NW SW 26-16s-32e. Anderson Ranch field has both Devonian and Wolfcamp production.

EASTERN INTERIOR

ILLINOIS

Salem Discovery in Jasper County Flows

First production of consequence from the Salem formation in Jasper County has been discovered by Pure Oil Co. in its A-5 John W. Honey well which flowed 300 bbl. of oil through 2-in. tubing.

The well, which produced from a depth of 3,290 to 3,305 ft., is centered in Pure's large leaseholdings already producing from the McClosky formation at about 3,000 ft. The nearest Salem production is about 11 miles south.

The Honey well, located in Section 17-5n-10e, was first tested in the Devonian lime at 4,558 ft. where it produced some oil and water. However, the well was plugged back and

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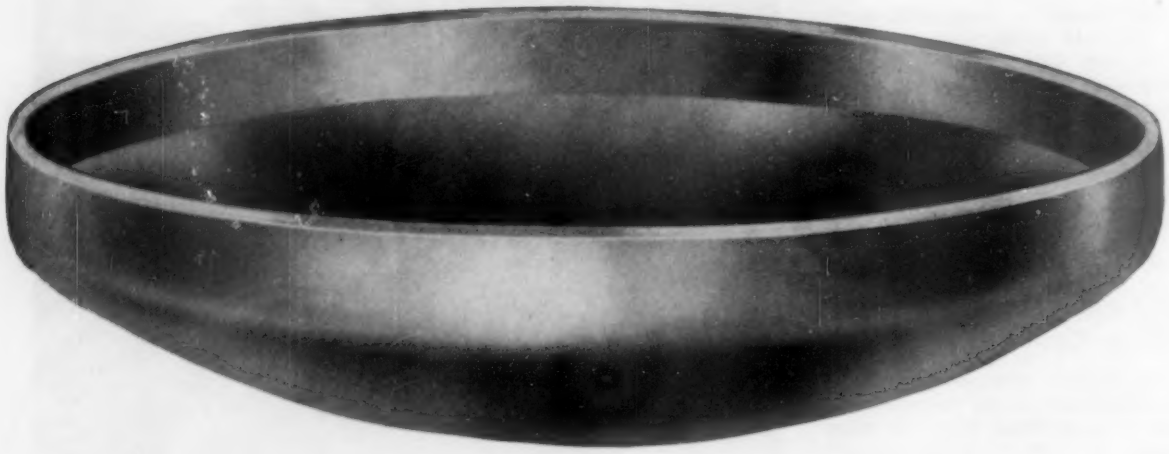

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completed in the Salem lime, and after a 5,000-gal. acid treatment, flowed 290 bbl. in 16 hours.

Relatively few wells in the deeper part of the Illinois basin have been carried below the McClosky formation.

Waltersburg Sand Discovery Reports High Hourly Flow

In Saline County, W. C. McBride 1 Flanders, SW NE SE 10-8s-7e, 1 mile northeast of Eldorado, kicked off to flow at the rate of 70 bbl. of oil per hour. This is a 1,680-bbl.-per day rate.

The well produces from the Waltersburg sand at 2,117-36 ft. after fracturing. The area is 1 mile from other production. Roy Pledger and H. E. Walton 1 Clark Community Unit, 20-8s-7e, flowed 1,200 bbl. of oil per day after fracturing the Waltersburg at 2,123-53 ft. This well is on the west side of Eldorado.

WESTERN KENTUCKY

In Henderson County, 2 miles northeast of Hebbardsville and 13 miles southeast of Henderson, B. A. Kaemmerer et al 1 Marshall-Adams Unit, 11-P-26, is going on the pump after swabbing 144 bbl. of oil daily from Jett sand at 1,374-86 ft.

● In Christian County, Walter Sargent and Associates 1 Littlepage Minerals, 1-G-26, is pumping 96 bbl. of oil per day after shot in the Jackson sand at 648-65 ft. This discovery well is 1½ miles south of Apex pool and 11 miles southwest of Greenville, Ky.

APPALACHIAN

WEST VIRGINIA

In Blue Sulphur district, Greenbrier County, West Virginia, Columbian Carbon Co. 1193 W. E. Hedrick, wildcat is drilling at 6,649 ft. The Big lime was recorded at 3,630 ft.

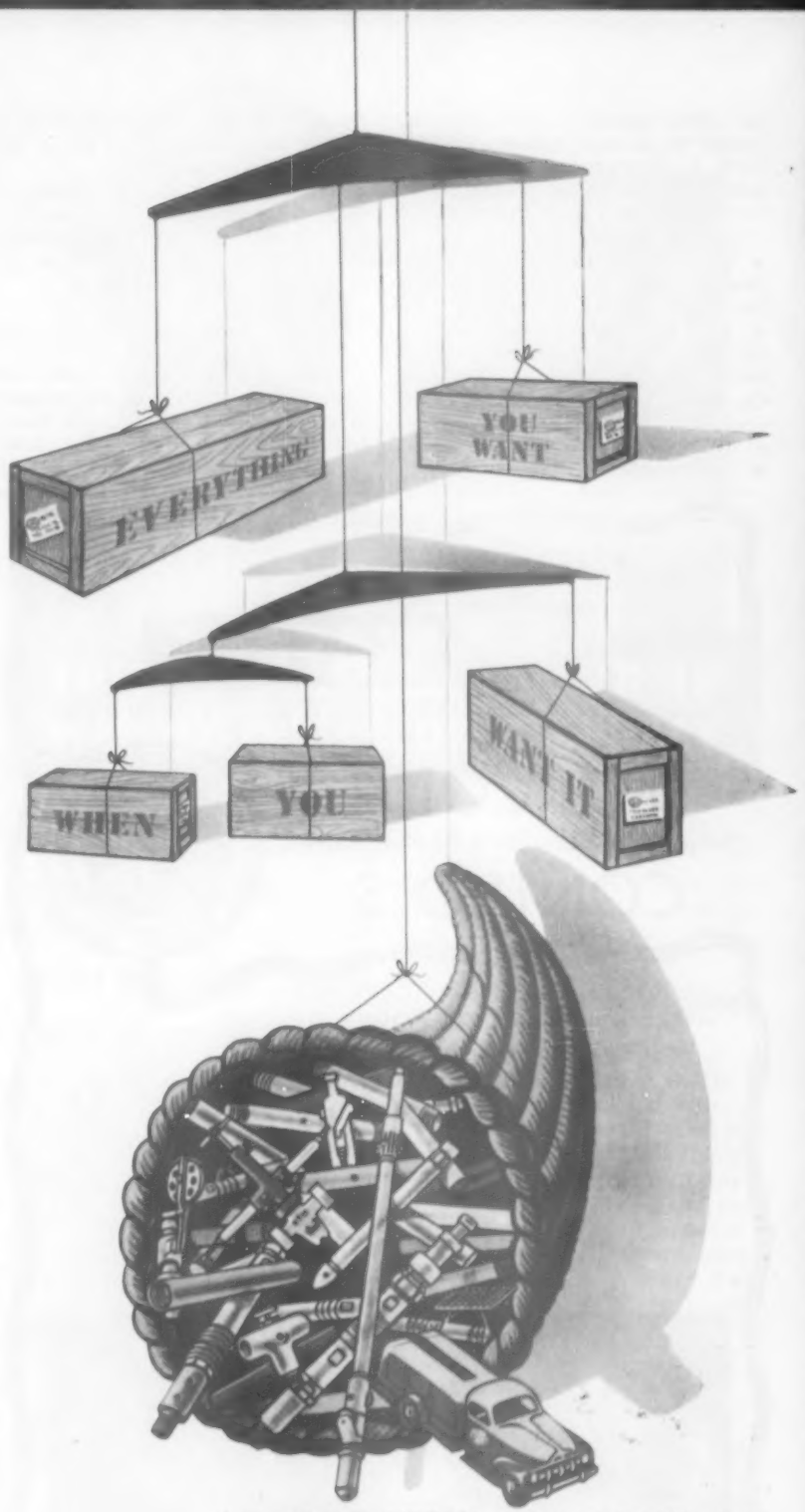
● In Gore district, Hampshire County, M. E. Anderson 1 Dolan heirs, has resumed drilling and is at 4,949 ft. The Oriskany sand, topped at 4,806 ft. had gas 4,832-55 ft., testing 836,000 cu. ft.

● Allen district, Morgan County, John Fox 1 Amasa Nestor, is drilling at 1,610 ft. Water was recorded at 1,052 ft.

● Circleville district, Pendleton County, Columbian Carbon Co., U.S.A. 2-1203, is drilling at 5,300 ft. The only gas show recorded was at 2,375 ft.

● Walker district, Wood County, Hope Natural Gas Co. 9634 Power Oil Co., deep test is again coring and is now at 11,521 ft.

In Union district, Preston County, West Virginia, Columbian Carbon Co.,



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has started drilling at 1207 Lawrence Burger et al, rank wildcat, elevation 2,543 ft., Kingwood Quadrangle, 4.91 miles south of latitude 39 degrees 20 minutes and .90 mile west of longitude 79 degrees 30 minutes.

● Grant district, Jackson County, two Oriskany sand wildcat locations have been announced, D. D. Foster 1, Isaac A. Taylor, elevation 715 ft., and Talbott Gas Co. 1 U. G. Talbott, elevation 840 ft. These wells are on the Belleville Quadrangle, south of latitude 39 degrees 05 minutes and west of longitude 81 degrees 40 minutes.

● Steele district, Wood County, Godfrey L. Cabot, Inc. 1423 Fee, wildcat, resulted in 320,000 cu. ft. gas in the Oriskany sand, TD 4,590 ft.

● Roaring Creek district, Randolph County, Cumberland & Allegheny Gas Co. 514 Luvena M. & Hoy Talbott, wildcat was dry but had a show of gas in the Fifth sand, TD 4,300 ft.

OHIO

Mid East Oil Co. moved 1 mile east of the oil pool at Metham, and brought in a gasser on 1 First Central Trust, 2nd Qr., Bethlehem Township, Coshocton County. Clinton sand at 3,435-85 ft. gaged 275,000 cu. ft. natural and 1,300,000 cu. ft. when shut-in after fracturing.

● A second producer was completed in the new pool north of Glenford by Clyde Foraker, Jr. on 1 Emma Noyes, Section 4, Hopewell Township, Perry County. Clinton was logged at 2,711-31 ft. with 3 bbl. natural and 50 bbl. in a 24-hour test after fracturing.

EASTERN KENTUCKY

United Fuel Gas Co. has completed their wildcat 5 Fordson Coal Co. as a gas producer. Test located in Clay County finaled for 133,000 cu. ft. of gas daily from the Devonian black shale and Corniferous limestone. Devonian shale was encountered from 2,222 to 2,245 ft. and the lime from 2,245 to 2,343 ft. Total depth was 2,360 ft. A 48-hour rock pressure test showed 312 lb.

In Breathitt County, United Fuel Gas Co. has abandoned their wildcat 8,280 Ervin Turner. Well was drilled to total depth of 2,407 ft. after having had no commercial shows in the Devonian black shale 1,930 to 2,180 ft., Corniferous lime 2,204 to 2,375 ft. and Big Six sand 2,375 to 2,405 ft.

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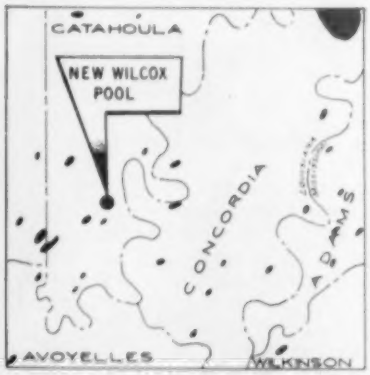
ARK-LA-TEX

NORTH LOUISIANA

Catahoula Wildcat Awaits Tests as Wilcox Discovery

A new Wilcox oil discovery 1⅛ miles northeast of Larto Lake field in southern Catahoula Parish is awaiting completion tests.



Arrow points to new Wilcox oil discovery northeast of Larto Lake field in southern Catahoula Parish, east-central Louisiana.

E. C. Wentworth 1 Beltzhoover et al, C SW NW 8-5n-6e, 1¼ miles southwest of Serena, kicked off and flowed after perforations. No gage was taken. Recovery on an open-hole drill-stem

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For further information ask for Bulletin P-10. Write: Martin-Decker, 3431 Cherry Ave., Long Beach 7, California, Dept. D-1.

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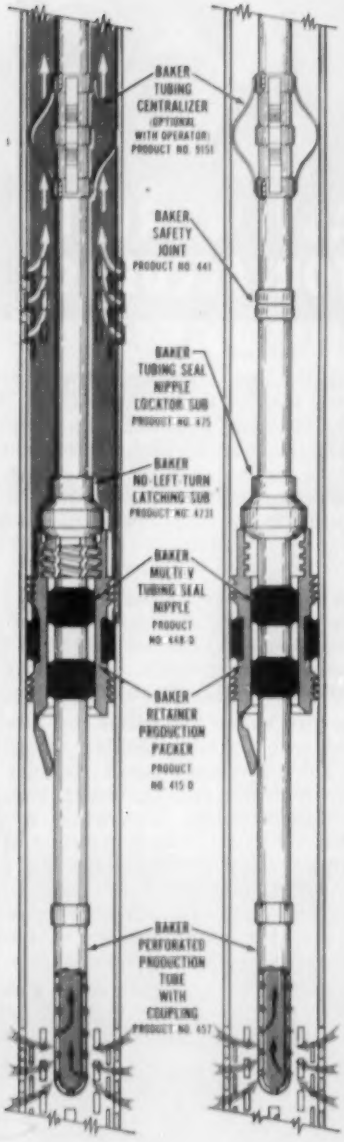
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Typical Dual Zone Hookup

Typical Single Zone Hookup

Do you know that with only ONE Baker Retainer Production Packer you can equip your well for *either* SINGLE ZONE or DUAL ZONE production? And that you can accomplish *any* type of completion for *any* method of production to meet *fixed* or *changing* well conditions?

A single Baker Retainer Production Packer will also outperform many specialized tools when used as a TESTING PACKER – SQUEEZE PACKER – GAS LIFT PACKER – PERMANENT COMPLETION PACKER – WATER FLOOD PACKER – GAS INJECTION PACKER – CORROSION CONTROL PACKER – TUBING ANCHOR – ONE-WAY BRIDGE PLUG – PERMANENT BRIDGE PLUG.

Every production man should be familiar with the many operating advantages of this "Universal Type" Packer, which include . . .

WIRE LINE SETTING – The packer can be set with *wire line speed and accuracy*, using the same set-up just used for perforating. The Baker Packer also can be set on drill pipe or tubing.

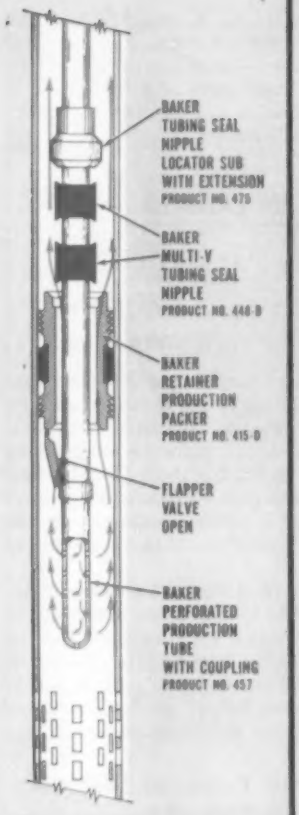
SETTING UNDER HIGH PRESSURE – By using a lubricator, the Baker Retainer Production Packer can be set under high pressure. From the moment it is set, the self-contained, flapper-type, back-pressure valve closes and isolates pressure below the packer.

TUBING STRING IS ALWAYS "FREE" – That valuable string of tubing – whether 1,000 feet or 16,000 feet in length – can be removed by simply picking up the tubing weight.

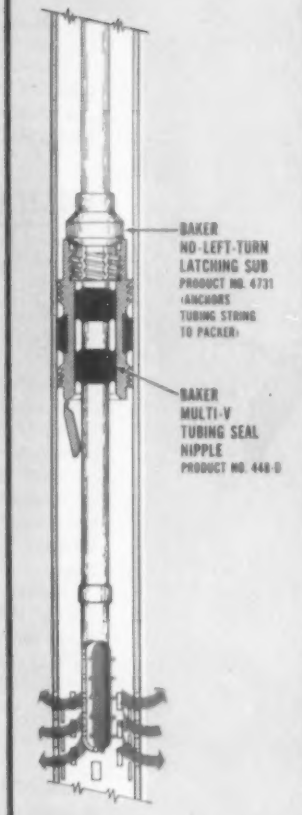
EXCESSIVE "SET-DOWN" WEIGHT OR TENSION NOT REQUIRED – Even when squeezing, formation fracturing, or producing at any depth under pressure, a perfect pack-off is maintained independent of excessive set-down weight, or tension.

HOLDS PRESSURE DIFFERENTIALS FROM ABOVE OR BELOW – Two sets of opposed slips, and a resilient packing confined by lead and metallic sealing rings, effect a permanent pack-off that will hold any pressure differential *either from above or below the packer* that is safe for the well equipment.

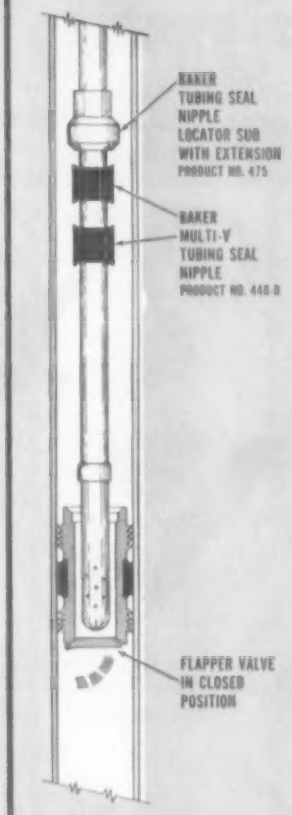
PACKS-OFF AND HOLDS UNDER HIGH BHT – Baker Retainer Production Packers will hold high pressures under conditions of high temperatures. Hundreds of Baker Packers are in successful service in Southwest and Gulf Coast areas where temperatures in excess of 300 degrees are not uncommon.



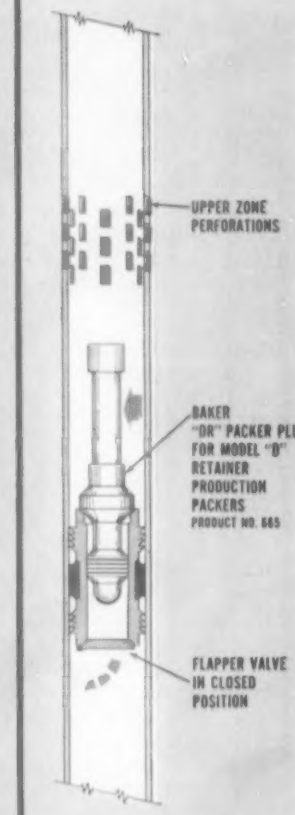
Washing or Circulating Tubing Seal Nipples removed from packer bore. Flapper Valve held open by tubing extending below Tubing Seal Nipples.



Pressuring Below Packer Acid or cement squeeze, formation fracture, gas or water injection. Latch Sub used when squeeze pressures exceed tubing weight.



Isolate Zone Below Packer Tubing String removed, Flapper Valve closed. Isolates pressure differentials (squeeze, productions) from below the packer.



Temporary Bridge Plug For working over zones above packer. DR Plug run in on Baker Retrievable Cementer, and retrieved with overshot. *Permanent Bridge Plug* can be formed with Trip Bob (not illustrated).

RESISTS CORROSION—The cast-iron used in the construction of Baker Packers is far more resistant to corrosion than the casing in which the packer is set, thus making it ideal for permanent installations, or for use in areas plagued with a severe corrosion problem.

EASILY DRILLABLE—The Baker Packer is constructed of drillable cast-iron, and its design supplements the breaking-up action of the bit. Whether it has been in the well for only a few hours, or for ten years, the Baker Packer can be drilled up in minimum time. Expensive and hazardous "milling-out" operations never are required.

IMPORTANT FACTS

Baker Packers are used in a majority of installations where conditions of extreme pressure, temperature, or depth are present. Baker Packers also dominate Dual Zone installations, particularly those involving two-packer, crossed-flow arrangements.

BUT IT IS ALSO TRUE that *more* Baker Packers are used for *simple single zone* completions than for *any other type of completion*, and that *most* Baker Dual Zone installations employ *only one* packer.

Ask any Baker representative, or office, for complete details, as well as your copy of the recent Baker Equipment News dealing with DUAL ZONE COMPLETION PRACTICES. There is no charge, and no obligation, for specific recommendations and completion planning advice available from Baker Technical Advisers. Why not be prepared for your next completion?

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test at 5,715-22 ft. was 997 ft. clean oil, and 126 ft. of mud.

The new Wilcox pool-opener is located ½ mile north of a 7,006-ft. Wilcox failure in C SW SW 8. It was Magnolia 1 Robinson.

WESTERN CANADA

ALBERTA

Cardium Sand Gas Strike Reported in Hugget Area

Another natural gas discovery has been recorded in the Cardium sand by Chas. U. Bay & Associates of Denver. This new discovery, in the Hugget area of West Leduc, lies about 10 miles west of Leduc region Devonian oil production and 6 miles southwest of the Golden Spike Devonian oil-producing area.

The well, 9 Cuba Troutman, LSD 9, 25-50-1w5, is 9 miles northwest of the group's first Cardium gas discovery well, 3 Cuba Harish. The Troutman well tested the Cardium sand at 3,185-99 ft. Gas flowed at the maximum rate of 2,060 M.c.f. per day.

Indicated Pembina Discovery Reported West of Proven Area

The Pembina area of Alberta came up with another indicated discovery in the Cardium sand, 3 miles west of proven production in that area.

The oil recovery was obtained at Hudson's Bay 1 West Pembina, LSD 6, 34-47-10w5, which is 3 miles southwest of Stanolind-Hudson's Bay E-1 Crown Cardium sand oil discovery well.

Moderate Gas Flow Reported At Grassy Island Lake Test

The California Standard Co. has encountered a moderate flow of gas during first Viking sand drill-stem test at its Grassy Island Lake wildcat in southeastern Alberta.

Gas flowed at the maximum rate of 1,140 M.c.f. per day at the well, which is in LSD 7, 14-34-7w4.

SASKATCHEWAN

Socony-Vacuum Reported Oil Strike at Coronach

Socony-Vacuum Oil Co. came up with this province's only discovery the past week. It was in the Coronach area where a slight showing of oil was found in the Mission Canyon-Mississippian. The well, Socony-Sohio 15-11 Coronach, LSD 11, 15-1-28w2, is about 20 miles southwest of a previous dry hole

a barrel to Lars Christensen Land and back

Unless the penguin and the seal of Lars Christensen Land suddenly become avid users of petroleum products, no one much cares about getting oil to that desolate Antarctic land.

But the round trip from New York to that ice-capped territory is over 21,000 miles . . . and if every barrel of crude oil that Cities Service piped through its own lines in one year were laid end to end, they would make that round trip with many barrels to spare.

Besides transporting millions of barrels of crude through its own lines, Cities Service moved over three hundred million barrels through the pipelines of associated companies.

This pipeline transportation represents just one method of moving vital petroleum products to eager users all over the United States . . . one link in the strong chain that is the backbone of our country's vital defense effort. Cities Service is proud of the part it plays in keeping America strong . . . and it's this strength that will keep America free.

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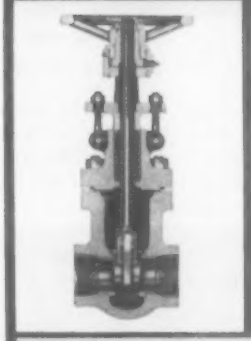

fig. no. 3651

o. s. & y., bolted bonnet gate valve. a premium valve available in a wide choice of trim materials and recommended where a full port opening is required.

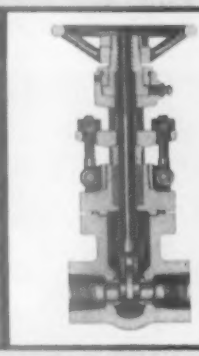

fig. no. 595

o. s. & y., bolted bonnet gate valve. comparable to fig. no. 3651 but somewhat more economical and its use is suggested where a full port opening is not essential.

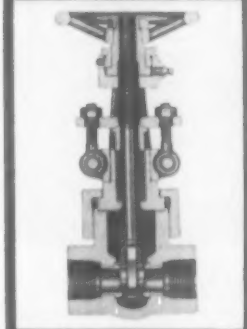

fig. no. 55

o. s. & y., union bonnet gate valve. an economical valve for those that prefer the compactness and dismantling features of the union bonnet construction.

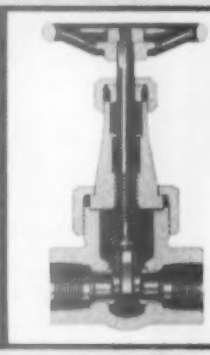

fig. no. 65

inside screw, union bonnet gate. a low cost compact valve for use where space and weight are important and where a full port opening is not required.

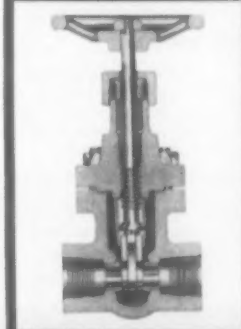

fig. no. 695

inside screw, bolted bonnet gate. the "competitor" to meet the tightest cost budget, yet offering the bolted-on bonnet feature. comparable to fig. no. 65.

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ROCKY MOUNTAIN

WYOMING

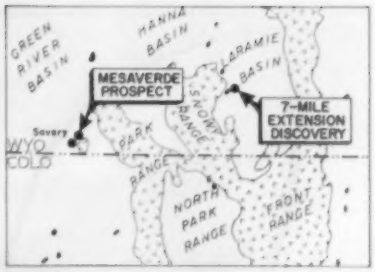
Two Powder River Basin Wildcats Staked

Carter Oil Co. has made location for wildcats on the west and east flanks of the Powder River basin. The company will drill 1 Ridge Road Unit, C NE SW 25-36n-79w, in Natrona County. The well is to test Lakota at about 7,000 ft.

The second wildcat is in Niobrara County, 4 miles north of production at Ant Hills. It is 1 Pfister, C NE NE 14-38n-63w, and will also test Lakota.

Sweetwater County Wildcat Runs Pipe

Gulf Oil Corporation has run casing at 1 Southwest Table Rock Unit, C NW SW 28-18n-98w, Sweetwater County. Total depth is 8,605 ft. The well had gas shows through several zones within Mesaverde, although none of the drill-stem test recoveries appeared commercial alone. The wildcat is within the Green River basin, and the area has had several recent Mesaverde discoveries. This formation had no attention prior to the past 2 or 3 years. Gas interest through southwestern Wyoming has increased appreciably since construction of new outlet for production has become a certainty.



Woodward Oil Co. 1 Bayer in the Savery area of Carbon County reported an unofficial flow of gas at rate of 3,000 to 4,000 M.c.f. per day from the Mesaverde. The California Co. recovered 1,450 ft. of mud-cut oil at 3 Unit in Albany County, 1 mile east of the Seven Mile Unit area on the western flank of the Laramie basin

COLORADO

Washington County Wildcat Finds "J" Sand Pay

Kingwood Oil Co. reported a flow of oil at the rate of 30 bbl. per hour on test of 2 Snyder, C SW SE 2-2n-54w, west central Washington County. Test well is 2 miles northeast of Buffalo pool. Test was of the interval 4,803-13 ft., and tool was open 2 hours. Flowing pressure was 425-1,100 psi. A later test below this zone recovered salt water. The operator is running casing with total depth at 4,859 ft.

Elbert County Wildcat Testing On Swab

Sinclair Oil & Gas Co. reported swab recovery of 36 bbl. of oil in 15 hours of swab tests at 1 Bradbury, NE NE NE 28-6s-61w, Elbert County. Test was of perforations at 7,175-82 ft. in "J" sand. The well is 22 miles south of previous production in the Denver-Julesburg basin, and if successful will be the first producer in Elbert County.

Completion Gages Reported At Three Discoveries

Skelly Oil Co. reported a flow of 228 bbl. of oil with 22 bbl of water per day at 3 Peterson, SW SW NW 13-1n-56w, Morgan County. The discovery is 3 miles northeast of Sand

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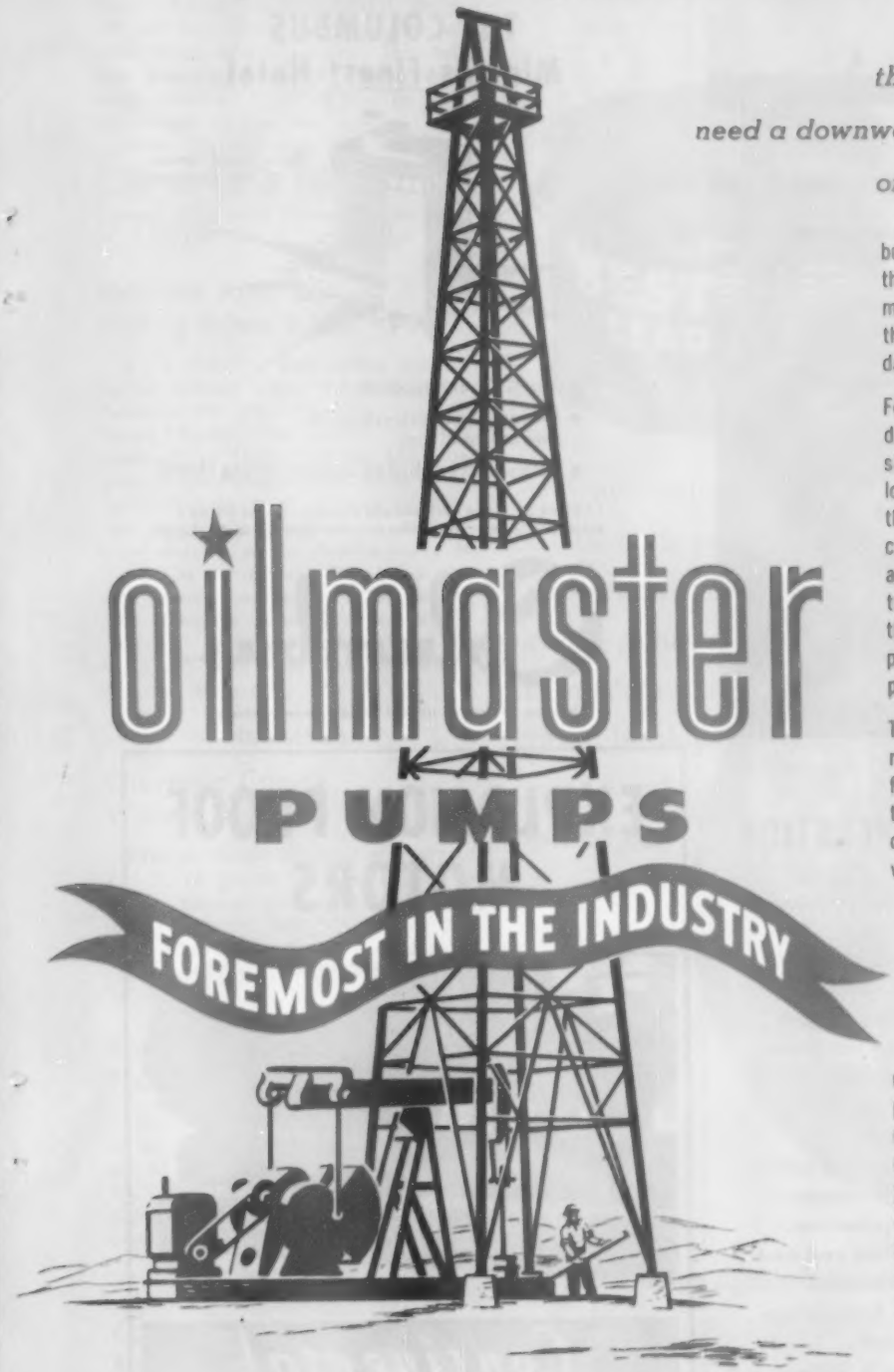

that an oil well might need a downwell compressor instead of a downwell pump...

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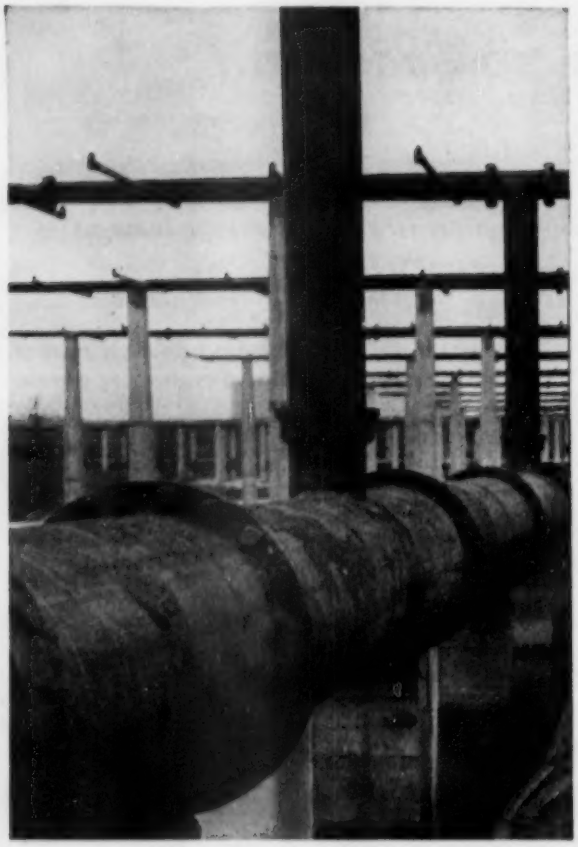

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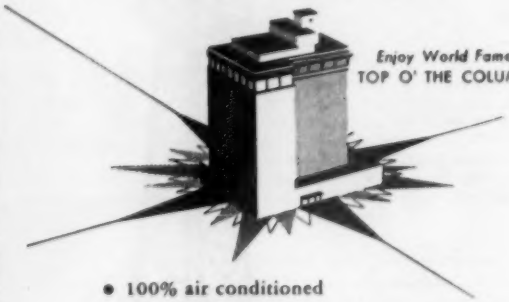

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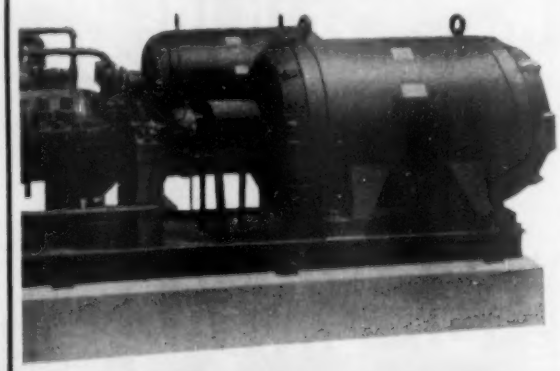

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River pool. Production is from "D" sand at 5,018-26 ft. Gage was through ¾-in. choke.

In Logan County, Gem Oil Co. and Potter Drilling Co. completed 1 Smith, SW SW NE 23-9n-55w for a flow of 4,000 M.c.f. of gas per day. This well also produced from "D" sand, with perforations at 5,415-18 ft. The well was completed and shut in.

Pubco Development Co. has completed a Fruitland discovery at 1 Ute Indian, NE SW SE 9-33n-9w, LaPlata County. The well flowed at the rate of 2,438,000 cu. ft. of gas per day.

Morrison Area Wildcat Drilling Below 9,500

S. D. Johnson and others are reported drilling below 9,550 ft. at 1 Pallaoro, SW NE NW 7-5s-79w, Jefferson County. The wildcat, 15 miles southwest of Denver in the Morrison area attracted considerable recent attention with recovery of oil from a formation tentatively identified as a limestone member of the Benton shale. It is now to test Dakota, which was the announced objective. It is in the faulted area along the mountain front on the west side of the Denver-Julesburg basin, an area which has had little previous drilling.

NEBRASKA

Cheyenne County Wildcat Tests Oil

Pray & Nelson reported recovery of 450 ft. of gas-cut oil and 135 ft. of heavily oil and gas-cut mud in 1-hour test at 1 Henry, NW NW SW 31-16n-51w, Cheyenne County. Test was in "D" sand and the operator will test "J" sand before attempting completion.

Kimball County Wildcat Possible Discovery

Tom Palmer, Inc. recovered 840 ft. of oil, cut with mud and gas on 1-hour test of the "D" sand at 6,150-58 ft. in 1-C State, SE SE NW 36-13n-55w, Kimball County. This operator will also core and test "J" sand.

UTAH

Carter Completing Bluebell Discovery

Carter Oil Co. has run casing at 2 Unit, C SW NW 3-1s-2w (USM) Duchesne County. Casing is landed at 9,650 ft., and the well has been plugged back to 8,895 ft. The apparent discovery is the second test of the Bluebell Unit. Oil was recovered

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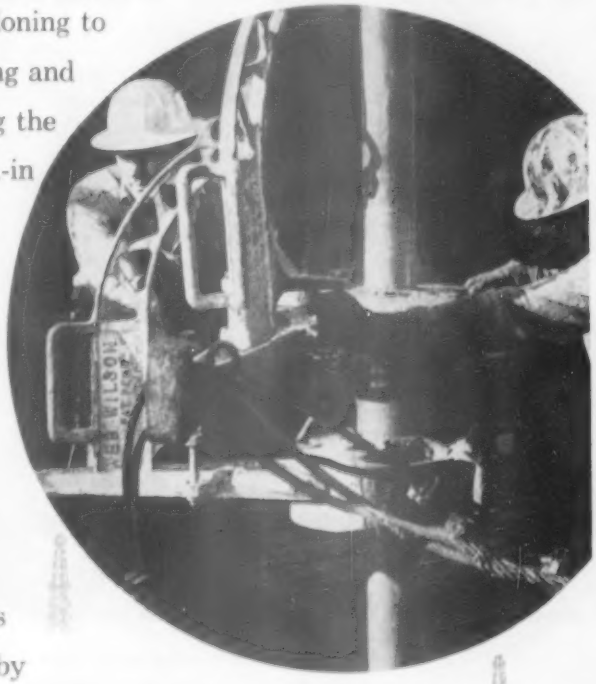

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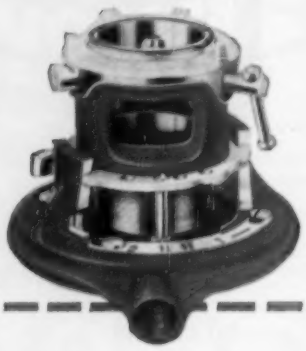

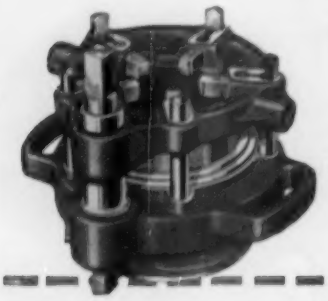

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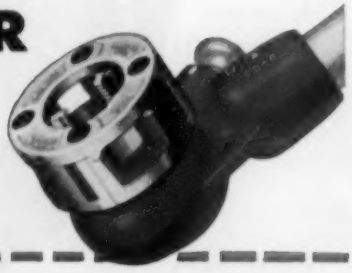

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on drill-stem test of two Green River zones.

MONTANA

West Poplar Discovery Gage Reported

Carter Oil Co. and Phillips Petroleum Co. have reported pump recovery of 60 bbl. of oil and 10 bbl. of water per day at 1 Tribal, C SW SW 5-29n-50e, Roosevelt County. The well is the first of four drilled in the West Poplar Unit by these operators to show for production. Production is from Madison at 6,450-58 ft. The discovery is 2 miles northwest of produtcion in East Poplar field.

GULF COAST

SOUTHWEST TEXAS

New Navarro Sand Field Opened in Dimmit County

Sutton Drilling Co., of San Antonio, has a new Navarro-Olmos sand oil-discovery well in northwestern Dimmit County, where its 1 Cleveland, a wildcat located 2 miles west of Cabeza Creek, flowed 76 bbl. of 44°-gravity oil per day through 5/32-in. choke.

Flow is with pressure of 160 psi. on the tubing with gas-oil ratio of 380 cu. ft. per barrel.

Olmos sand is producing from a casing-perforated interval at 2,536-41 ft. Total depth is 3,000 ft.

The well was drilled by Talvez Oil Co. and taken over by Sutton Drilling Co. for completion.

Location is approximately 2 miles southwest of Carrizo Springs, where first Olmos oil production along the northwestern Dimmit County trend was opened January 1941. Exploration since

Arrow points to Sutton Drilling Co.'s new Olmos sand oil-discovery in Dimmit County.

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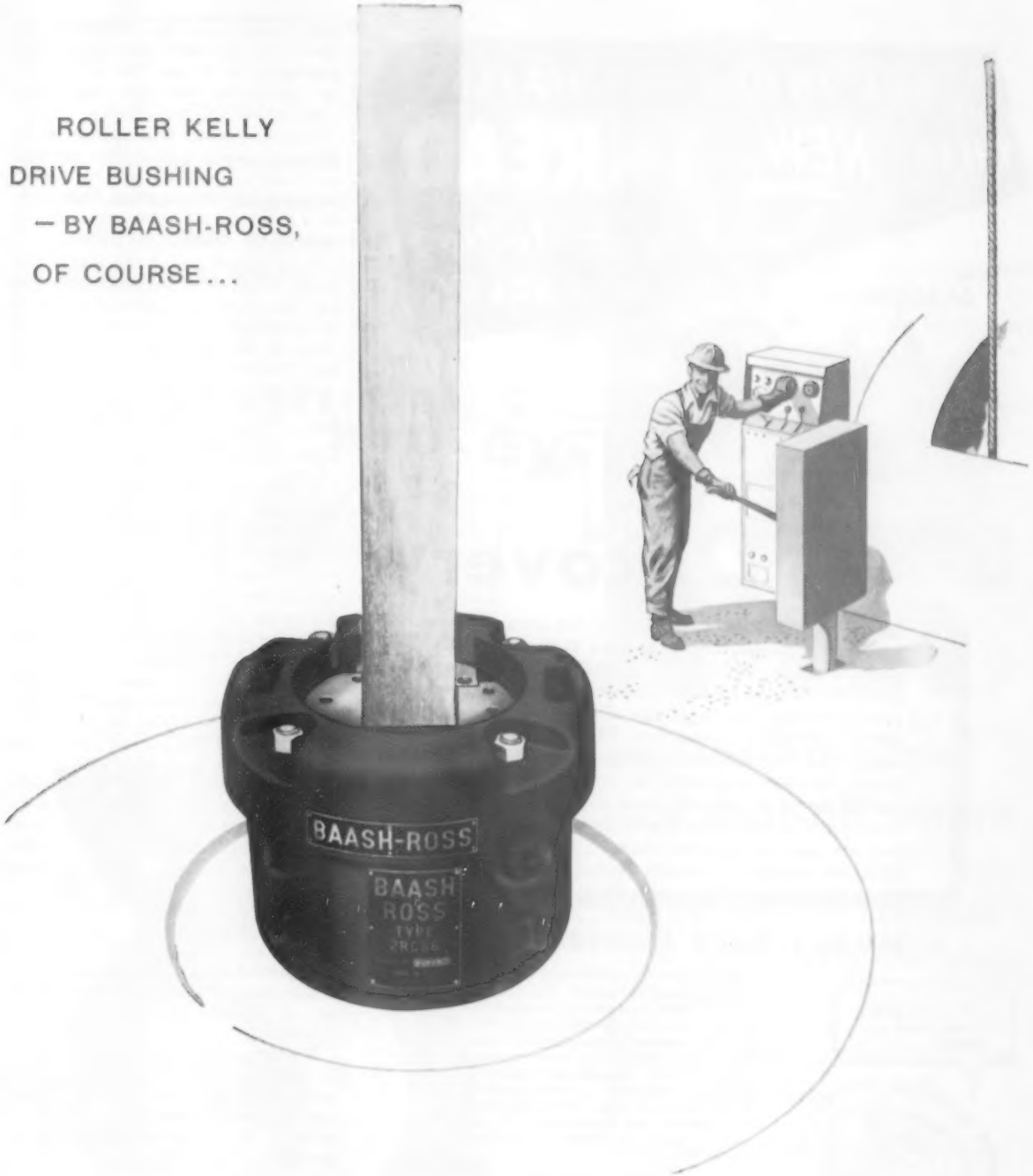

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then in that area has resulted in discovery of six additional fields, four productive of oil, and two of gas. So far, production has been small, with wells limited to small areas.

Currently, only Wintergarden field, located just south of Carrizo Springs, and discovered in March 1949, is receiving steady development, this being by Continental Oil Co. with one rig running.

Since completion of the Sutton discovery well, M. E. Andrews, of Houston, has started a semiwildcat test in the immediate area at 1 Johnson. Location is in Lot 2, Block 11, city of San Antonio Valley Ditch Co. Survey

San Miguel Creek Field Gets New Pay Discovery

Humble Oil & Refining Co. is opening a new Wilcox oil-producing sand in San Miguel Creek field, in northern McMullen County.

Its 3 Gubbels, new-pay discovery well, is rated good for 40 bbl. of 23.7°-gravity oil per day on the pump. It is producing from casing-perforated sand interval at 5,628-34 ft.

It gives the field, discovered in November 1948, its fourth productive well, including three yielding oil from Wilcox sands, and one gas and condensate from a deep sand at 10,149-82 ft.

Discovery well, drilled by Atlantic Refining Co., was completed as an oil well in Wilcox sand interval at 5,778-86 ft. Subsequent wells have been drilled by Humble, the first being the deep gasser, rated good for 100,000,000 cu. ft. daily. It is 3,500 ft. southeast of Atlantic's discovery. The next, a half mile to the southeast, was drilled to 11,010 ft. Failing to find the deep pays, it was plugged back and completed as an oil producer in sand interval at 5,741-59 ft.

While opening a new pay zone at its 3 Gubbels, Humble has failed to find production in a concurrently drilled test, 4 Gubbels, now being plugged at 6,208 ft. It is a qurter mile east of the company's initial oil well.

SOUTH LOUISIANA

New Producer Extends Scott Field Westward

Production of Scott field, west of Lafayette, in Lafayette Parish, is being extended ¼ mile to the west by Union Sulphur & Oil Corp. at its 1 Dominque.

The new well, Union Sulphur's first in the area, has a potential flow of 142 bbl. of 36.3°-gravity oil per day through 3/32-in. choke. Production is from the field's Frio-Richard sand

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with perforations at 10,556-65 ft. Flowing pressure is 1,400 psi., and gas-oil ratio 612 cu. ft. per barrel.

This is the fourth productive well completed in the field, opened last February by Bates & Cornell. Production also has been confirmed by the discovery well's west offset and by a southwest outpost, both drilled by the discovery operators. Pan American Production Co.'s east offset to the discovery well failed to find commercial production.

Discovery of this field opened the parish's first oil production.

Second Well Confirms West Maxie Discovery

Humble Oil & Refining Co. has confirmed Hassie Hunt Trust's discovery last January of West Maxie field, 7 miles northwest of Crowley, in Acadia.

Humble's confirmation well, 1 Mayes, diagonal southwest offset to the discovery well, and first test drilled since completion of that well, is good for 144 bbl. of 51.5°-gravity oil per day, flowing through ⅛-in. choke with 2,980,000 cu. ft. of gas under pressure of 7,500 psi.

The discovery well flowed 25 bbl. of 51.5°-gravity oil with 4,500,000 cu. ft. of gas per day through 11/64-in. choke. Production is from Frio sand, Humble's well being perforated at 11,272-86 ft., and the discovery well at 11,257-67 ft. Discovery well is on a "farmout" from Humble.

The area is about 2 miles north of Ellis field, and about the same distance west of the original Maxie area.

TEXAS GULF COAST

Oil Production Opened in Algoa New-Pay Discovery

Superior Oil Co.'s second well in the recently opened Algoa field, in Galveston County, has been completed as an oil producer in a shallower sand than the discovery well's gas-condensate pay zone.

The new producer is the company's 1-A Cooper Unit, located approximately 2,300 ft. northwest of the discovery well, 1 Cooper, completed in October. Potential gage was 145.11 bbl. of 34.6°-gravity oil per day, flowing through 7/64-in. choke with tubing pressure of 1,360 psi. and gas-oil ratio of 779 cu. ft. per barrel.

Producing interval is 9,538-41 ft. The discovery well is productive of gas and condensate from sand at 11,659-65 ft.

Superior's third test, 1 Crooker, now drilling, is 1,100 ft. east of the new oil producer. Location also has been made for another test, 1 Light, ¾ mile north-

One of the reasons Flexite plunger pumps make good production in almost any kind of well is the Flexite Ring itself. Flexite Rings are made of a special hard plastic composition impregnated with graphite for self-lubrication; they will not corrode or disintegrate, nor do they depend upon swelling for their sealing action. Flexite pumps are available in a wide range of sizes in all standard A.P.I. types, including heavy-duty models with double-thick barrel tubes for deep-well pumping. Harbison-Fischer pumps, sub-assemblies, and parts are sold from stock by supply stores in all major producing areas. Your store or one of our factory representatives will be glad to give you complete details and make special recommendations without obligation.

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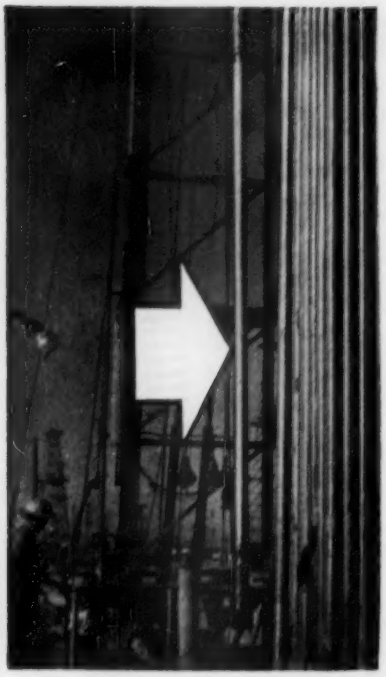
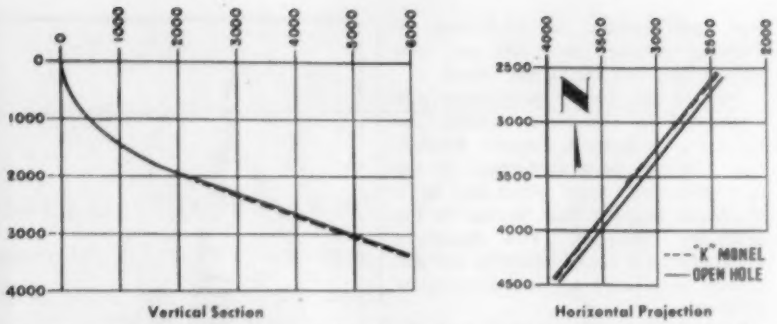


Set-up of string in the Wilmington, California field. The Servco 20′ "K" Monel Collar is as strong as any steel drill section, takes drilling stresses equally well. No special fittings or handling.



How Open-Hole and "K" Monel Collar Surveys Compare – Surveys by both methods were checked in a rapidly built up high angle hole. Notice how closely they agree.

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While going remains easy, you will probably want to make several surveys on a wire line through the drill pipe during each bit run. When hard formation is reached, and bit runs become shorter, you can "go-devil" the instrument at the end of each run and retrieve it when the drill string is pulled.

To get a complete survey, "go-devil" a multi-shot instrument the same way. Then take all the pictures you want on the way up. Regardless of angle, the "K" Monel Collar keeps the instrument aligned and prevents "droop" error.

Isn't that easy . . . and inexpensive? Not an extra round trip! No pulling of center bits! No lost instruments or snagged wire to retrieve. Often, in fact, you can get your records while retrieving a core barrel or performing some other chore.

When it comes to positioning deflecting tools, use a "K" Monel Orientation Sub in the drill string. It will help insure the same accuracy and protection during your survey.

The SERVCO CORPORATION can supply you with over 35 different types of drill collars and orientation subs in popular sizes and fitted with conventional tool joints. SERVCO is located at 904 Security Building, Long Beach 2, Calif.

To handle other tough oil field problems, calling for special metals like "K" Monel, come to Inco. One of the many Inco Nickel Alloys is likely to provide just what you need.

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Why Survey Drill Collars are made of "K" Monel

1. **"K" Monel is permanently non-magnetic** down to −100°C. Its maximum permeability of 1.02 is only slightly greater than air at 1.00. It will not become magnetic through cold-working in the well or as a result of high well temperatures.

2. **"K" Monel compares favorably with steel.** "K" Monel Collars don't wear quite so well as steel collars but they are tougher and stronger. Yield strength, 120,000 psi; tensile strength, 153,000 psi; elongation, 23%; Brinnell hardness, 278.

3. **"K" Monel resists corrosion.** In marine locations and in sour wells, "K" Monel gives outstanding performance...often outlasts other materials by years.

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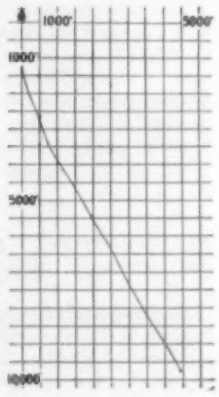


Survey of an Offshore Directionally Drilled Well

Max. angle, 36° 30′; total deflection, 4,433 ft.; total measured depth, 10,900 ft.; true vertical depth, 9,748 ft.; drill collar "K" Monel.

east of the gas-condensate discovery well. Hole is projected to 13,000 ft.

The area is approximately a mile north of Algoa, in the northwestern part of the county, near the Brazoria County line, and about 4 miles southeast of Hastings field.

Fourth Zone Produces in New East Aransas Field

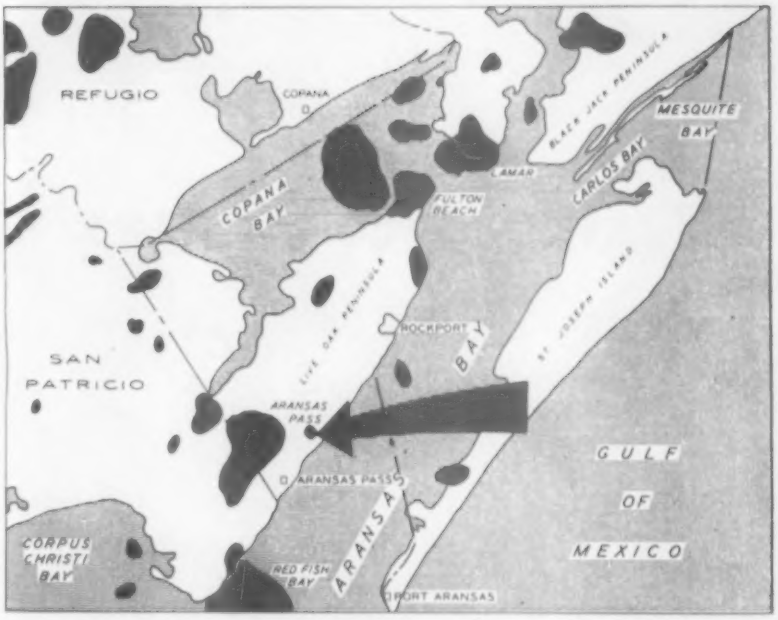
Another sand, the fourth, has been found productive in the new East Aransas field, Aransas County.

The discovery has been made by Atlantic Refining Co. in its 1 Heist, completed with oil production from casing-perforated interval at 7,364-74 ft., the new pay zone, and gas-condensate production from a previously discovered deeper zone, perforated at 7,774-86 ft.

Oil flow from the new 7,300-ft. pay on completion gage was at the rate of 120 bbl. per day through 3/16-in. choke with pressure of 350 psi. and gas-oil ratio of 867 cu. ft. per barrel. Oil-gravity is 38.7°.

It is a dual completion with the new, shallower oil sand producing through the casing annulus, and the deeper gas-condensate sand to be produced through the tubing.

The new well is Atlantic's second and the field's third. It is approximately 3,250 ft. south-southeast of the field's discovery well, completed by Atlantic last July with gas-condensate production from sand at 7,014-36 ft.



Arrow points to new East Aransas field, in Aransas County, where fourth Marginulina sand has been proved productive in field's third well.

The field's other well, completed earlier this month by Arnold O. Morgan and B. A. Wales, is productive of gas and condensate from the 7,675-ft. sand, and oil from a still deeper pay

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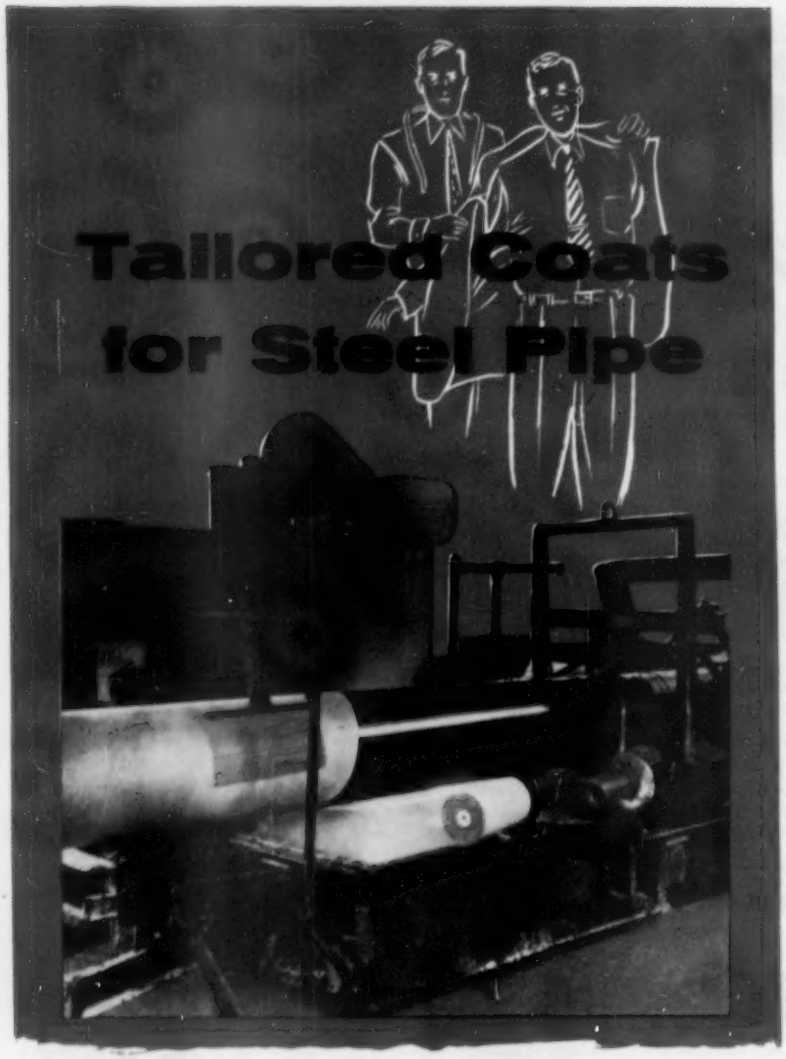

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7,804-07 ft. This well is approximately 4,750 ft. southwest of Atlantic's discovery well, and about 2,600 ft. southwest of Atlantic second, and new-pay discovery well. All sands are in the Marginulina section.

Three other tests are drilling in the immediate area, and locations have been made for five more.

The area is approximately 5 miles northeast of Aransas Pass and about 2½ miles east of Aransas Pass field.

BASIN AND RANGE

NEVADA

Nevada Test Dry

Shell Oil Co. was abandoning its 2 Eagle Springs Unit in 2-7n-56e, 10 miles southwest of Nevada's sole oil well in Nye County. Total depth reached was 10,183 ft. The company's fourth well, which was being rigged up, will be 35-35 Eagle Springs Unit in 35-9n-57e, a south offset to the discovery.

Successful Wildcats

SOUTHWEST TEXAS

Hidalgo County: Magnolia Petroleum Co. 1-Hidalgo-Willacy Oil Co., Lot 2, Block 13, MTK&I Co. Subd. (2 miles north of Hargil). IP 105.82 BOPD, 9/64-in., 42.3°, perforations 11,241-66 ft. and 11,258-77 ft. TD 13,000 ft. (New field—Hargil.)

TEXAS GULF COAST

Bee County: H. C. Spoor, Jr., 1 Malone et al, Thomas B. Malone Sur. (5 miles south of Pawnee). IP 2,230 M.c.f. daily, open flow, dry gas, Pettus sand 3,022-25 ft. (perforations). TD 4,000 ft. (Extends Malone area.)

Harris County: J. M. Flaitz and R. B. Mitchell 1 Wise, H. C. McIntyre Sur., A-916. IP 40.07 BOPD (net), 12/64-in., 43°, Yequa-Goodykoontz sand 7,315-19 ft. and 7,322-25 ft. (perforations). TD 8,225 ft. (New field—Satsuma South.)

Jackson County: Holmes Drilling Co. and John B. Coffee 2 Lorenzen, Sec. 1, Hahl Subd., Harwood-Burns Ranch, J. J. Linn Sur., A-213. IP 37,500 M.c.f. daily, open flow, dry gas, Frio 5,825-29 ft. (perforations). TD 5,837 ft. (New pay in John Coffee field.)

Nueces County: Republic Natural Gas Co. 1 Bevly, BS&F Sur. 165, A-55. IP 104 BOPD, ⅛-in., 46°, Sinton sand 6,094-6,100 ft. (perforations). TD 8,919 ft. (New field, or extends Baldwin area.)

San Patricio County: Republic Natural Gas Co. 1 McCarthy, G. H. Paul Subd. (3 miles west of Gregory). IP 346 BOPD, 10/64-in., 43°, perforations 8,741-51 ft. TD 10,014 ft. (New pay in East Midway field.)

WEST CENTRAL TEXAS

Jones County: Fletcher Oil & Gas Corp. 1 White, 24-16-T&P, 5 miles S Hawley. IP 351 BOPD, 11/64-in., 40°, GOR 300, TP 190 psi., upper Canyon sand 3,054-60 ft. TD 3,069 ft.

Trockmorton County: Warren Petroleum Corp. 1 Thompson, TE&L Sur. 1697,

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BH-438-A	4	38"	150 TONS

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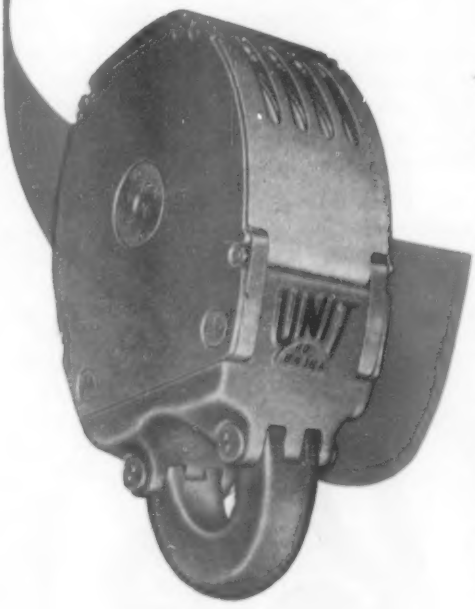
B-438-A	4	38"	200 TONS
B-544-A	5	44"	300 TONS



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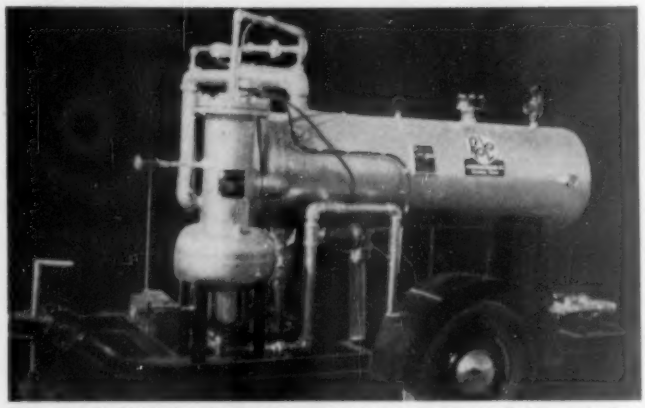


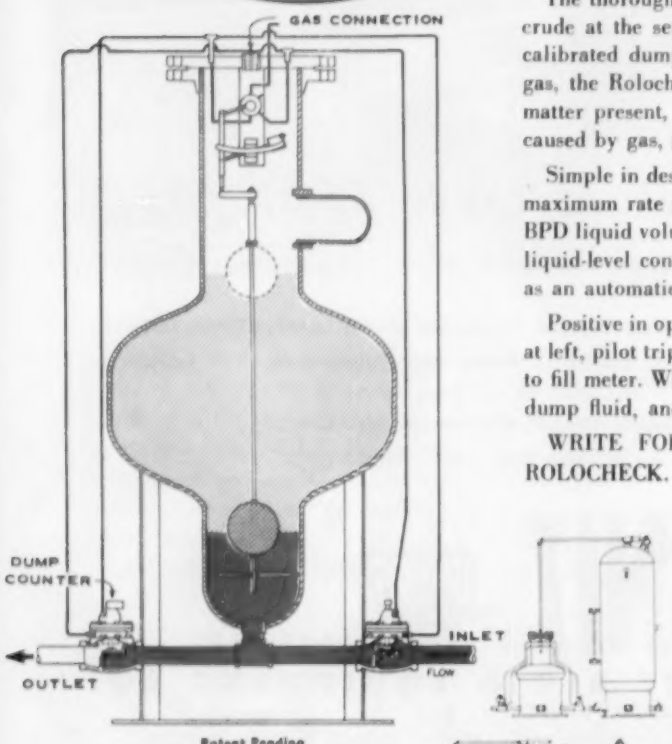
RM 1-24 ROLOCHECK and Rolo Automatic Liquid Sampler installed on Rolo Type 1H-2406-18 Horizontal Wellchecker.

The thoroughly field tested new ROLOCHECK oil well meter measures crude at the separator on the lease, and automatically dumps a positive calibrated dump each time with high degree of accuracy. Unaffected by gas, the Rolocheck functions equally well with high amounts of foreign matter present, thus eliminating expensive maintenance problems usually caused by gas, sand and other solids in crude oil.

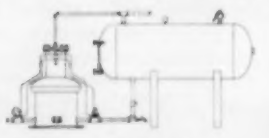
Simple in design, the new Model No. RM 1-24 ROLOCHECK has a high maximum rate and zero minimum rate, and can handle as much as 1,440 BPD liquid volume at 12 psi. differential pressure. The new unit operates as liquid-level controller for the separator, and with modifications can serve as an automatic water knockout, as well as water meter.

Positive in operation, when float hits lower stop, as shown in the diagram at left, pilot trips to close outlet valve, and opens inlet valve simultaneously to fill meter. When float hits upper stop, pilot trips to open outlet valve to dump fluid, and closes inlet valve simultaneously.

WRITE FOR COMPLETE SPECIFICATIONS ON THE NEW ROLOCHECK.



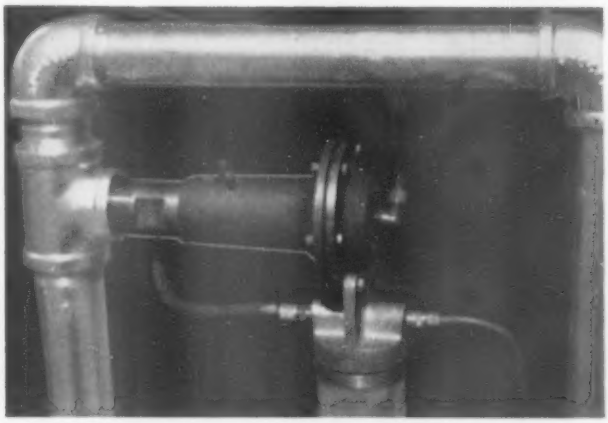
Patent Pending



The ROLOCHECK functions equally well when installed on horizontal or vertical separators or a heater-treater. The only difference is in the piping layout and height of meter. Since the meter acts as liquid-level controller on separator, the upper stop must be on a level with fluid level desired in the separator.

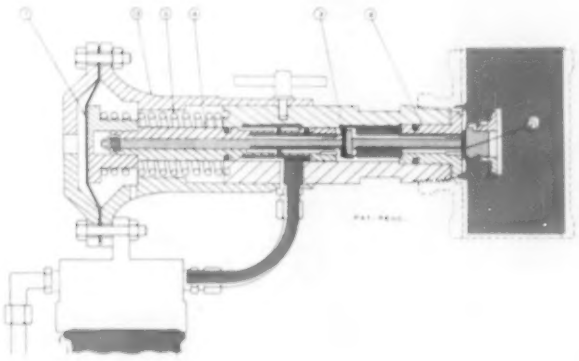
Rolo ®

well production new ROLO® way . . .



Rolo Automatic Liquid Sampler installed on Rolo Type 1H-2406-18 Horizontal Wellchecker to sample a vertical column of fluid in motion.

Take accurate flow line samples with ROLO® Automatic Liquid Sampler



Diaphragm (1) actuates plunger (4) which closes against valve (3) to close discharge line. Plunger movement opens sample valve (2) and pushes displacement piston (9) into flow stream to take sample. As pressure is bled off diaphragm, tension of spring (5) reverses travel of plunger (4), closing valve (2) and opening discharge valve (3). Line pressure forces displacement piston (9) to discharge sample into jar.

WRITE FOR COMPLETE SPECIFICATIONS OF NEW ROLO AUTOMATIC LIQUID SAMPLER.

The new Rolo Automatic Liquid Sampler takes representative samples from a vertical column of moving liquid under pressure to determine relative amounts of oil, water and sediment flowing through the line. Sampler operates only when liquid is moving past sample taking point, assuring accuracy obtainable only from vertical column of fluid in motion.

The diaphragm operated Rolo Sampler uses an entirely new principle, and has a minimum of moving parts. The Sampler efficiently operates by any existing snap action pilot on the separator, or an auxiliary pilot may be used to supply liquid, gas or any mixture under pressure of 15 psi or more to the diaphragm chamber.

REMOTE COUNTERS FOR ROLOCHECK METERS—Remote counters may be supplied to record by electricity from a short distance up to about 1000 miles. This telemetering system operates on 110, 220 or 440 volts, AC or DC, or impulse from the meter can be relayed with DC current over telephone wire as small as No. 26, without using batteries. The totally enclosed mercury switch attached to the ROLOCHECK is both explosion and corrosion proof, and transmission and receiving systems are protected against outside interference. Printers recording production are also available.

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SUCCESSFUL WILDCATS

A-505, 8 miles NE Woodson. IPP 32 BOPD, 42°, GOR 145, Mississippian pay 4,696 ft. TD 4,706 ft.

NORTH TEXAS

Clay County: Akin & Dimock 1 Reeder, Blk. 104, Wood CSL, 3 miles NE Prospect. Previously drilled dry to 4,444 ft. IP 356 BOPD, 8/64-in., 42°, TD 437 psi., GOR 200, Caddo pay 5,722 ft., new TD 5,737 ft.

Jack Grace Production Co. 1 Edwards, S. C. Beldon Sur., A-12, 6 miles E Henrietta. IP 256 BOPD, 16/64-in., TP 375 psi., 43°, GOR 700, Caddo perforations 5,829-54 ft. TD 6,104 ft.

Cooke County: Ada Oil Co. 1 Green, Gideon Rose Sur., A-848, 2 miles NE Balm. IP 160 BOPD, ½-in., 34°, TP 100 psi., GOR 150, Pennsylvanian sand 6,330-39, 6,314-24 ft. TD 7,168 ft.

Kay Kimbell 1 Cunningham, G. C. Wright Sur., A-1463. IPP 93 BOPD, 38°, GOR 100, Strawn 2,817-33 ft. TD 5,515 ft.

Grayson County: Lone Star Producing Co. 1 O'Hagan, J. S. Coffee Sur., A-232, 5 miles NW Sherman. IP 358 BOPD, ¾-in., 28.8°, TP 60 psi., GOR 547, perforated Pennsylvanian 8,942-80 ft. TD 9,637 ft.

Jack County: Lone Star Producing 1-B Yates, R. Laudermilk Sur., A-353, 5 miles E Stewarton. IP 2,830 M.c.f., 30/64-in., plus 11 bbl. distillate, TP 485 psi., perforated conglomerate 5,401-27 ft. TD 5,644 ft.

Warren Petroleum Corp. 2 Lupton-Brown, T. Lewellyn Sur., A-358, 5 miles E Jacksboro. IP 19.7 BOPD, 48/64-in., TP 80 psi., 36.9°, GOR 21,600, conglomerate 5,460-70 ft. TD 5,619 ft.

Montague County: Tom B. Medders 1 Caswell, Blk. 38, Titus CSL Sur., 4½ miles NE Sunset. IPP 75 BOPD, 42°, GOR 300, conglomerate pay 6,026 ft. TD 6,413 ft.

WEST TEXAS

Crane County: Atlantic Refining Co. 1-36 Everett & Glass, 36-43-T4S-T&P, 10 miles N Crane. IP 104 BOPD, 22/64-in., TP 100-40 psi., GOR 552, 40°, Pennsylvanian perforations 9,042-9,112 ft. Elev. 2,755 ft., ground, TD 12,690 ft.

Shell Oil Co. 1-30 University "A," 25-30-University Lands, 7 miles NE Crane. IP 311 BOPD, ½-in., TP 65 psi., GOR 265, 32°, pay 3,520 ft. Elev. 2,622 ft., TD 12,158 ft., Ellenburger 11,982 ft.

Ector County: The Texas Co. 1 Texas-Magnolia-Ratliff, 25-42-T1S-T&P, 8 miles N Odessa. IP 579.6 BOPD, 48/64-in., 54.5°, TP 25 psi., GOR 1,136, Ellenburger perforations 13,560-80 ft. TD 13,625 ft., elev. 3,012 ft.

Gaines County: Honolulu Oil Corp. 1 Wescott, 2-C44-PSL, 6 miles SE Seminole. IP 1,168 BOPD, 11/32-in., 47.9°, TP 650 psi., GOR 837, Pennsylvanian pay 10,980-11,008 ft. TD 14,284 ft., elev. 3,251 ft., Ellenburger 13,808 ft., pre-Cambrian 14,277 ft.

Midland County: A. Fasken 1-14 Fasken, 14-37-T2S-J. V. Stokes Sur., 18 miles SE Midland. IP 82.5 BOPD, ⅜-in., 32°, GOR 200, TP 40 psi., pay 3,943 ft. TD 3,959 ft.

Mitchell County: Sid Katz 1 Morrison, 34-29-T1N-T&P, 2 miles N Iatan. IPP 68.58 BOPD, 28°, GOR nil, pay 2,648 ft. TD 3,050 ft.

Upton County: Gulf Oil Corp. 3 McElroy Ranch "H," 38-42-T5S-T&P, Pennsylvanian pay discovery in Texel field. Pennsylvanian IP 261 BOPD, 12/64-in., 45.6°, CP 1,350 psi., GOR 1,531, perforated 9,143-95 ft. Devonian IP 81 BOPD, 16/64-in., GOR 1,719, 45°, TP 275 psi. TD 12,505 ft.

ILLINOIS

Sangamon County: W. F. Wooters 1 Robinson, NW NW SE 10-14n-4w. IPF 148 BOPD, Silurian 1,732-43, 41.8°. TD 1,743 ft. (Opens New City pool.)

SOUTH LOUISIANA

Cameron Parish: Magnolia Petroleum Co. 2-A State Lease 1153, Block 110, West Cameron area, Gulf of Mexico. IP 30 BCPD and 3,750 M.c.f. daily, ¼-in., 42°, Miocene 6,696-6,716 ft. and 7,978-8,008 ft. (perforations). TD 11,341 ft. (Confirmation well and new pay in West Cameron Block 110 field.)

Plaquemines Parish: Shell Oil Co. 1-B State Lease 1008, Block 24, South Pass area, Gulf of Mexico. IP 225 BOPD, 10/64-in., 32°, perforations 7,400-10 ft. TD 7,500 ft. (Extends, and new pay in Block 27 field.)

NORTH LOUISIANA

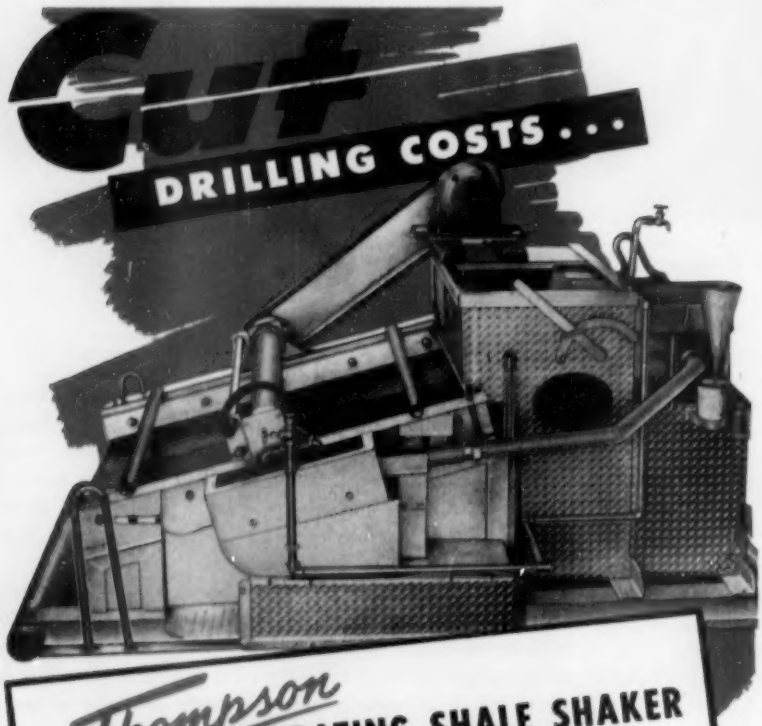
Grant Parish: Clay Oil & Gas Corp. 1 Urania, 24-7n-1e. IPP 31 BOPD, Sparta 1,813-17 ft., 18°. TD 1,817 ft. (Opens Manistee field.)

OKLAHOMA

Carter County: Carter Oil Co. 1 Markland-Goddard, SW SE NW 20-4s-1w. IPP 125 BOPD, Fus. and Tussy 6,330-7,568 ft., 32°. TD 9,870 ft. (Oil discovery.)

Kay County: Royal 1 De Bord, NW NW SW 9-28n-1e. IPP 38 BOPD, Miss. lime 3,391-99 ft., 39.5°. TD 3,410 ft. (New pay ½ mile south of Dilworth.)

Lincoln County: Northern Oil Co. and Continental Oil Co. 1 Barney, 1¼ miles north Wellston, NW NW SW 12-14n-2e.



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TIW Tension-Type Tubing Anchors have been thoroughly shop and field tested, and proven to dependably hold tubing in tension with positive slip grip on casing, regardless of fluid levels and pressure differentials.

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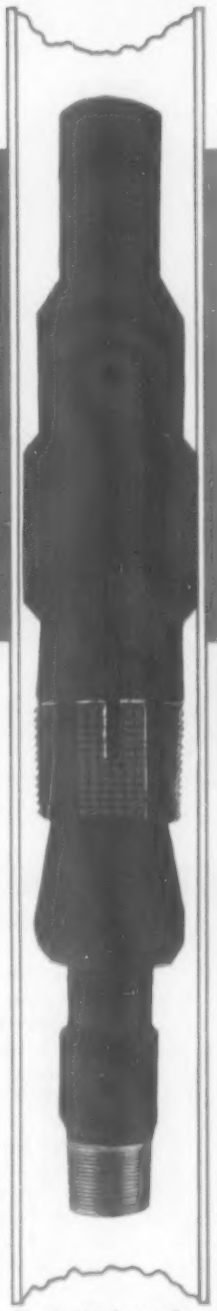

Fig. 1. TIW Tension-Type Tubing Anchor prepared for running in, with slips retracted.

Fig. 2. TIW Anchor in set position, with slips extended.

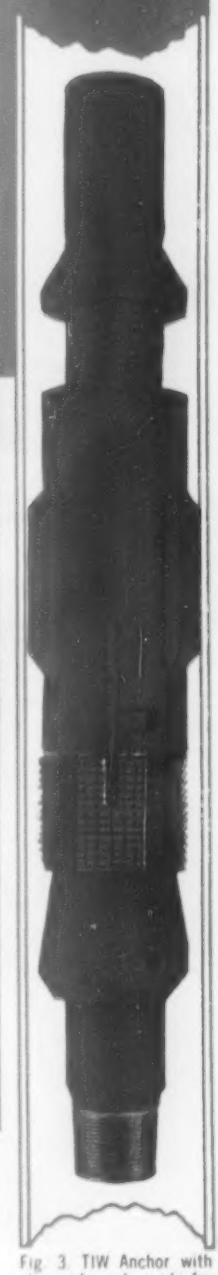

Fig. 3. TIW Anchor with slips released, ready for removal of the tubing.

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SUCCESSFUL WILDCATS

IPF 50 BOPD Cherokee 3,542-56 ft., 5,780 M.c.f. of gas, 50°, ½-in. choke. TD 5,182 ft. (Oil discovery.)

Oklahoma County: Powel Briscoe, Inc. 1 Nichols, SE NW NE 6-14n-1e. IPF 25 BOPD, 1,500 M.c.f. of gas per day, Cherokee sand 4,420-32 ft., 71.5°, 17/64-in. choke. TD 4,520 ft. (Gas-condensate discovery 1⅜ miles north of Northwest Luther field.)

Stephens County: Atkinson 1 Johnson-Brooks, SW NE SE 6-1s-8w. IPF 96 BOPD, 2,250-70 ft., Brooks sand, 30°, 10/64-in. choke. TD 2,270 ft. (Geol. wildcat in North Duncan pool.)

Texas County: Carter Oil Co. et al 1 Lillau-Flowers, SW SW NE 25-1n-19eCM. IPP 168 BOPD, Morrow sand 6,963-77 ft., 41°. TD 7,027 ft. (Oil discovery.)

Carter 1 Gibson, C SE NE 21-2n-19eCM. IP 12,000 M.c.f. of gas per day, Morrow sand 6,464-71 ft. TD 6,912 ft. (Gas discovery.)

Underwood 1 Williams, C NW NE 14-4n-10eCM. IPF 65 BOPD, 4,028-21 ft., 41°. ¼-in. tubing choke. TD 4,695 ft. (Oil discovery.)

KANSAS

Kingman County: Time Petroleum Co. 1 Folk, SE SE NW 32-30s-9w. IP 5,850 M.c.f. of gas per day, Miss. 4,325-35 ft. TD 4,835 ft. (Gas discovery.)

Phillips County: Jones, Shelburne & Farmer 1 Bales, NE NE SW 16-4s-19w. IPP 20 BOPD, Lansing-Kansas City 3,212-14 ft. TD 3,606 ft. (Opens Wolf Creek.)

NEBRASKA

Deuel County: Kansas-Nebraska Natural Gas Co. 1-C Troelstrup, NW SE SE 2-12n-43w. IP 2,828 M.c.f. of gas per day, "D" sand gas discovery, new field. TD 3,224 ft. "D" sand.

CALIFORNIA

Kern County: Drilling & Production Co. 33-33 J.V., SE NW 33-11n-19w, IPF 495 BOPD through 14/64-in. choke, 38° gravity, 1,200 psi. tubing pressure, perfs. 7,007-39 ft., TD 7,066 ft. (New Jewett sand pool 1 mile west of Olcese pool in Tejon-Grapevine field.)

Gilliland Oil Co. 1 Barker, SE SW 3-25s-18e, IPF 360 BOPD through 24/64-in. choke, 40.6° gravity, perfs, 1,858-2,150 ft., TD 2,300 ft. (New fault block pool in Gagany Gap area.)

Tide Water Associated Oil Co. 63-18 Loepp, SW NE 18-28s-25e, IPF 5,500 M.c.f. gas rate on 1-hour test, 32/64-in. choke, 1,020 psi. tubing pressure, perfs. 4,297-4,305 ft., TD 4,325 ft. (New gas field discovery in Shafter area.)

UTAH

Grand County, Crescent Junction: Kimball Oil Co. 1 State-Kimball, NW NW NE 16-22s-19e. IPP 20 BO in 16 hours. TD 1,202 ft. Morrison.

COLORADO

LaPlata County: Pubco Development Co. 1 Ute, NE SW NE 9-33n-9w. IP 2,438 M.c.f. in 3 hours, Fruitland discovery, new field. TD 2,804 ft. Fruitland.

Logan County: Gem Oil Co. and Potter Drilling Co. 1 Smith, SW SW NE 23-9n-55w. IP 4,000 M.c.f. of gas per day, "D" sand discovery, new field. TD 5,582 ft. "J" sand.

Morgan County, Boots Hill: Skelly Oil Co. 3 Peterson, SW SW NW 13-1n-56w. IPF 228 BOPD, "D" sand oil discovery, new field. TD 5,202 ft. "J" sand.

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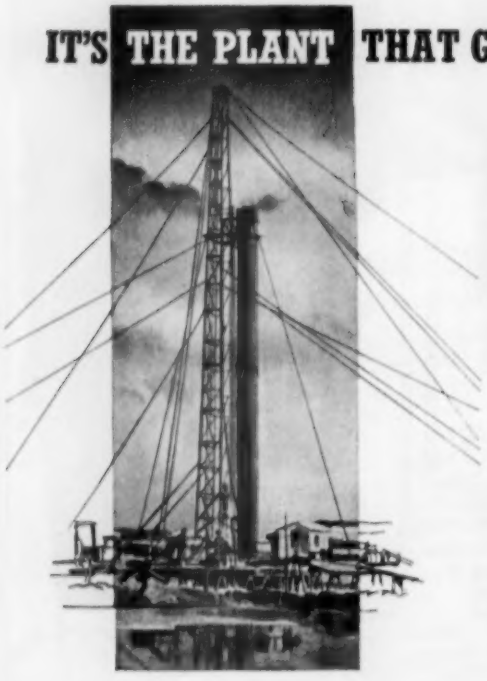

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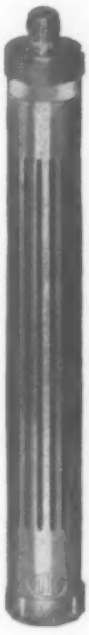

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Dropped down drill pipe; picked up with core barrel overshot.

Dropped down drill pipe; recovered when bit is changed.

Run in the Recorder connected to a core barrel overshot when picking up a retractable core barrel.

Run in and out on ordinary sand line.

Be **SURE** *you know, use* **TOTCO**

makes a good mud better

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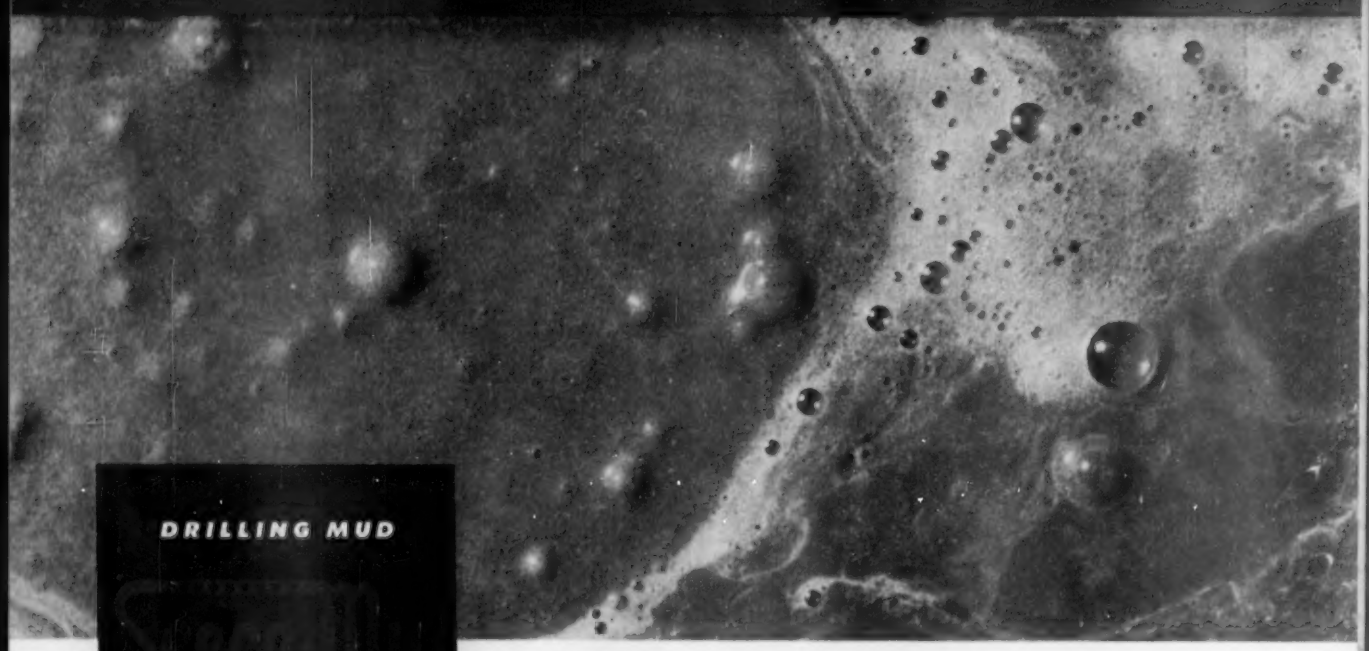

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In many fields—one in the Corpus Christi area, for example—Seeco-Mul has reduced mud costs and rig time by as much as one-half over ordinary muds. Using a Seeco-Mul emulsion mud probably will do as much for your drilling programs, too. Ask your mud dealer for more particulars, or write to us. We'll be glad to send you complete information without obligation. Crossett Chemical Company Division of The Crossett Company, Crossett, Arkansas.

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Henquet Back Home

Native Frenchman aids foreign oil operators

FEW oil men have an international reputation even remotely rivaling that of Roger Henquet.

To many oil men in scattered sections of the globe, this 49-year-old native Parisian is symbolic of the constant, world-wide drive to improve the techniques used in finding and producing oil. He is a recognized expert on petroleum in the United States, in Europe, in South America, in North Africa, and in the Middle East. He has done perhaps as much as any man in the industry to knock down national barriers against the interchange of technological developments.

Henquet (pronounced Ahn'kay) was educated in his native France. He studied science and philosophy and obtained a mining engineer's degree from the School of Mines at Nancy.

Technician . . . On May 11, 1929, the young graduate joined the French Schlumberger group, and after a short period of training he was sent to the United States to promote the new Schlumberger well-logging methods. As roving ambassador for Schlumberger, Henquet helped establish its service as standard practice not only in the United States but in many foreign fields.

Following World War II, he was named executive vice president of Schlumberger Well Surveying Corp., which had been established in the United States in 1934. He held that post 6 years. During that time Schlumberger introduced many new techniques in oil-field services, and its operations multiplied.

Henquet resigned his Schlumberger job June 30, 1951. A few weeks later, he was back in Paris, this time as a representative of Superior Oil Co. He established European headquarters at Paris as a relay point between Los Angeles and the Persian Gulf, where Superior had concessions along the shores of Qatar, Abu Dhabi, and Dubai.

When Superior decided in 1952 to relinquish title to these concessions, Henquet was authorized to remain in Paris and pursue for himself work which he had started in Europe on behalf of the company.

In 1953, Henquet helped organize Societe d'Etudes Petrolieres, a firm devoted to the study of mutual problems concerning the American and the European oil industry. The firm, which is associated with several American drilling, servicing, and supply companies, specializes in foreign operations—from application for permits to servicing of wells.

War hero . . . Henquet became an American citizen the hard way—by parachuting into France and organizing underground resistance preceding the Allied invasion.

Having had previous military experience in France, Henquet joined the Office of Strategic Services and was called to active duty in November 1943. He was dropped into France in civilian clothes in May 1944 and helped organize the underground movement there for 90 days before liberation by the Third Army.

He received a battlefield commission as second lieutenant in the American Army in July 1944, and was made an American citizen in London 2 months later, after completion of his mission in France.

For his heroic service during the war, Henquet was awarded the Croix de Guerre by the French Government and the Distinguished Service Cross by the U. S. Army.

The man . . . Henquet is an athletically-built, youthful-looking man with the urbane manner of an international play boy. But he finds little time for play.

A former business associate on this side of the Atlantic recalls Henquet as "one of the most dynamic individuals" he ever knew. "The fellow was just going all the time . . ." While serving as executive vice president of Schlumberger, Henquet "had his finger on the pulse of the business from the top to the bottom," his friend recalls.

A sports enthusiast, Henquet formerly was an ardent tennis player. "He was just as good at playing as he was at working," explains one American who used to work with him. "He played energetically and with a will to win."

Henquet now resides in Paris. He is married and has two daughters, 21 and 16. *(See Henquet's article, "Oil Companies Look to France," page 210.)*

J. E. WILSON

J. E. Wilson has been promoted to exploration manager of the Denver area by Shell Oil Co. He succeeds **R. E. McAdams,** who has moved to the firm's New York offices. Wilson, who joined Shell in 1938, has held various geological positions in Shell's exploration and production departments in Texas, Oklahoma, Colorado, and Wyoming. He has been in the Denver office since January 1954.

V. C. Georgescu has been appointed an assistant coordinator of producing activities by Standard Oil Co. (N. J.). Georgescu served with the oil industry of his native Romania as a member of the Jersey Standard affiliate there before joining the company's producing coordination staff in 1947. In the last few years he has been dealing primarily with Middle East and Far East operations.

E. E. McPherson has been named management adviser at the Heath refinery (Newark, Ohio) of Pure Oil Co.

E. E. McPHERSON

D. P. HANKINS

McPherson, who started with Pure 35 years ago and has spent all his time at Heath refinery, had been serving as manager of the plant. **David P. Hankins,** assistant manager of the refinery, has been named manager.

PERSONALS

Hankins has been in Pure's refining division for 30 years and had served at the Cabin Creek, W. Va., and Toledo refineries before coming to Heath.

L. A. CURRAN

L. A. Curran, general superintendent of Aurora Gasoline Co., of Detroit, has been promoted to general manager of refining of the firm's three refineries in Michigan. **P. A. Blasco,** who has been serving as assistant to the superintendent, has been advanced to assistant manager of refining. Other promotions announced by Aurora are **Soma Kurtis,** promoted from engineer in the manufacturing department to director of manufacturing; **H. J. Oberding,** advanced from chief process engineer to chief engineer; **Donald Albaugh,** advanced in the engineering department to assistant chief engineer; **F. W. Schuessler,** named traffic manager; **Charles Nannes,** advanced to director of purchases; and **W. C. Gleich,** promoted to manager of crude-oil supply.

P. A. BLASCO

SOMA KURTIS

H. J. OBERDING

D. ALBAUGH

Bill Adent has resigned as general manager of William, Ross & Cabeen, Dallas, to join Gulf Oil Corp.'s geological staff at Ardmore, Okla.

H. S. Rose, president of United Natural Gas Co., has announced he will retire when his present term of office expires on January 20, 1955. Rose began his long natural-gas career in New York City in 1903 as a messenger for National Fuel Gas Co.

John R. Bowman, director of research at Mellon Institute for Industrial Research, Pittsburgh, has received the 1954 Professional Progress Award in Chemical Engineering, sponsored by Celanese Corporation of America and administered by American Institute of Chemical Engineers. Bowman is widely known through the petroleum industry for his talks and papers on distillation theory, chemical constitution of petroleum, physical properties of wax, fractional crystallization, mass spectrometry, and gaseous diffusion and combustion.

R. J. Schilthuis has been named assistant manager by Humble Oil & Refining Co. of the production department in charge of natural-gas production, casinghead-gas plants, and gas transportation. He will also coordinate sales of natural gas. Schilthuis replaces **John O. Sue,** who will retire December 27. Other changes announced by Humble include **John J. Carter,** named division superintendent of the gas division to replace Schilthuis; **John Yeager,** gas superintendent of the Louisiana division, named acting assistant division superintendent of the gas division for a 6-month training assignment; **R. J. Sullivan,** named assistant chief engineer of the gas division on December 1, will be acting chief engineer for a 6-month training assignment; **E. O. Staffel, Jr.,** chief engineer of the gas division, replaces Yeager in the Louisiana division for a 6-month training assignment; **H. A. Weeks,** civil engineer in the East Texas division office, has been transferred to the West Texas division office; **J. H. Kinnaird,** civil engineer in the West Texas office has been transferred to the civil engineering division of the Houston office.

Joe McConnico, former superintendent of operations for Peppers Refining Co. at Oklahoma City, has opened offices as a refinery consultant there.

C. D. (Chuck) Edwards, former district geologist for General Petroleum Corp., has opened offices as a consultant in Bakersfield, Calif.

Henry E. Winter has been named regional executive for South American producing by Standard Oil Co. (N. J.). Winter has been with affiliates of Jersey Standard since 1934 when he joined Lago Oil & Transport Co., Ltd., in Netherlands West Indies as a student engineer. From 1939 to 1954 Winter served with Creole Petroleum Corp.'s economic department in Caracas and Maracaibo. He joined the Jersey Standard producing coordination staff in August.

Barnett F. Dodge, professor and head of the chemical-engineering department at Yale University, has been elected president of the American Institute of Chemical Engineers. Other officers elected were **Arthur K. Doolittle,** assistant director of research, Carbon & Carbide Chemicals Co., vice president; **George Granger Brown,** dean of engineering, University of Michigan, re-elected treasurer; and **F. J. Van Antwerpen,** former editor of Chemical Engineering Progress, executive secretary.

New Mexico Oil and Gas Association Officials Elected

New Mexico Oil and Gas Association recently held its 26th annual meeting at Albuquerque and elected its officers for the coming year. Named were (left to right): Fred W. Moxey, who was reappointed executive secretary; Harvey Yates, independent from Artesia, vice president; Emery Carper, Carper Drilling Co., of Artesia, reelected president for his eighth consecutive term; and John M. Kelly, Roswell independent, re-elected treasurer.

PERSONALS

Robert L. Rist, division geologist for Monterey Oil Co.'s northern division, has been transferred to the Louisiana division, where he will be assistant head geologist.

H. W. Penterman, executive assistant to the Tulsa area vice president of Shell Oil Co. since 1948, has been transferred to a similar position in the Denver area, effective January 1. Penterman joined Shell in 1919 and for the past several years has been closely associated with the Elk City, Okla., field and gas-cycling plant, which Shell operates. **R. L. Trott,** land assistant in Shell's head office exploration and production department at New York City, has been named to succeed Penterman at Tulsa.

PENTERMAN

R. L. TROTT

John Maxson, consulting geologist, has been elected president of the Rocky Mountain Association of Geologists. Other officers elected were **Jack Knight,** British-American Oil Producing Co., first vice president; **Robert Kretz,** consultant, second vice president; and **Joe Jackson,** Sinclair Oil & Gas Co., secretary-treasurer.

P. J. Byrne, Jr., has been named manager in charge of coordinating activities of three newly established divisions of the Esso Engineering Department of Standard Oil Development Co. Division directors are **Maurice W. Mayer,** economics; **Channing C. Nelson,** design division; and **Allen J. Ely,** mechanical division.

T. H. Marshall, retired executive vice president of Anderson-Prichard Oil Corp., has been reelected to his fourth term as president of the Kansas-Oklahoma Division of Mid-Continent Oil and Gas Association. **Clarel B. Mapes,** now in his twenty-eighth year with the association, was reelected secretary-treasurer. Other officers, who were reelected, are: **Villard Martin,** Tulsa attorney, first vice president; **J. A. Vickers,** Wichita, president, Vickers Petroleum Co., vice president for western Kansas; **Carl Weiner,** Chanute, Kans., independent producer, vice president for eastern Kansas; **Rayburn L. Foster,** vice president and general counsel, Phillips Petroleum Co., Bartlesville, Okla., vice president for northern Oklahoma; **Ward S. Merrick,** independent producer, Ardmore, Okla., vice president for southern Oklahoma; and **Dean A. McGee,** president, Kerr-McGee Oil Industries, Inc., Oklahoma City, vice president for western Oklahoma.

Harold Burrow, N. W. Freeman, R. C. Graham, C. A. Lingo, W. C. McGee, Jr., and **R. L. McVey** have been promoted to senior vice presidents of Tennessee Gas Transmission Co. Each had been serving in a vice presidency before his promotion. Other officers of the company named to be vice presidents were **C. C. Johnson,** treasurer; **W. D. Walser,** sales manager; **R. L. Jones,** sales manager; **W. W. Witmer,** gas contracts manager; **Stone Wells,** administrative assistant; and **S. C. Oliphant** and **R. R. Dean,** who have been vice presidents of the company's oil and gas-producing affiliate, Tennessee Production Co.

Charles F. Barnard has joined Minnesota Pipe Line Co. at St. Paul as chief engineer. Before joining Minnesota, Barnard was senior engineer with Interstate Oil Pipe Line Co.

John R. McMillan, president of Fullerton Oil & Gas Corp. before its recent purchase by Monterey Oil Co., has been named executive vice president of Monterey.

H. B. Sawatzky has been named to the newly created post of geophysicist in the petroleum and natural-gas division by the Saskatchewan Public Service Commission.

J. E. Finley has been elected 1955 president of the Permian Basin Geophysical Society. Other new officers are: **Bill Johnson,** Honolulu Oil Corp., first vice president; **R. M. Pinson,** Union Oil Co. of California, second vice president; **Paul C. Reed,** Forest Oil Corp., district representative to the national organization; **Noel Park,** Standard Oil Co. of Texas, treasurer; and **Joseph S. Plorest,** secretary.

DEATHS

E. A. Craft, 61, Houston, president of Rio Bravo Oil Co., died December 20. He was also executive vice president of Southern Pacific Lines in Texas and Louisiana.

John A. Britton, Jr., 62, who retired in 1953 as president and director of Enjay Co., Inc., an affiliate of Standard Oil Co. (N. J.), died recently at his home in Short Hills, N. J. Britton joined Standard Oil Development Co. in 1920 after having served as a gas engineer with Pacific Gas & Electric Co.

Maxwell E. McDowell, 60, national tax authority who retired 3 years ago as head of the tax department of Standard Oil Co. (N. J.), died recently at his home in Scarsdale, N. Y.

H. L. (Toppy) Rau, former geologist with Carter Oil Co., died recently at the Veterans hospital at McKinney, Tex. Rau was in charge of Carter's work during the Greater Seminole boom.

Floyd Maddox, independent Dallas oil operator, died recently in Dallas after a long illness.

Fletcher G. Lippitt, 61, Dallas independent operator with holdings in West Texas, died recently in Dallas.

Fred Norton, 62, one of the pioneers in the development of motor oil, died recently at Cleveland. Norton was assistant retail sales manager for Ohio Oil Co. at the time of his death. Norton was instrumental in the development of the first detergent motor oils while chief engineer in Ohio's lubrication-sales department during the mid-thirties.

Harry L. Shoemaker, 62, former Standard Oil Co. (N.J.) executive, died recently at his home in East Orange, N. J. Shoemaker was instrumental in drafting many of the nation's fire-protection laws governing petroleum hauling.

Ed Hollyfield, 74, partner in Hollyfield & McFarland Oil Co., of El Dorado, Ark., died recently at his El Dorado home. Hollyfield was a member of the state oil and gas commission and formerly was on the Arkansas board of conservation.

Luther Miller, 55, Bismarck, N. D., independent operator, died December 21, while on vacation in Oklahoma City. Miller was with the Government before entering the oil business and during World War II was an executive in the Office of Price Administration in Oklahoma City.

Here's How WALKER-NEER SPUDDERS

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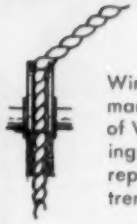

Wire rope economy is a primary factor in the designing of Walker-Neer Spudders. Savings to operators, in wire rope replacement costs, have proved tremendous.

Note in the pictures at left how alert engineering has reduced abrasion, friction, bending, and other abuse to wire rope.

Spudding sheave and heel sheave both travel. Note that the rope never veers off the spudding sheave at a sharp angle (as in sketch, top right) to create friction between sheave and rope. Full travel of both spudding sheave and heel sheave assures close, efficient winding on the drum—without requiring the use of a manual spooling device.

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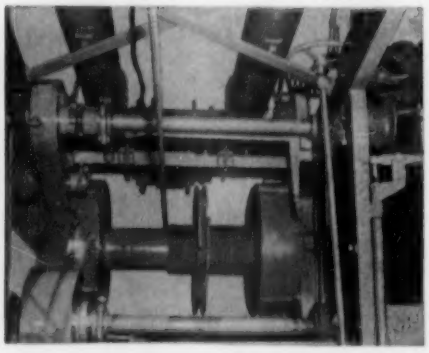

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Full width calf reel—on Models S-43, S-310, C-33, C-34, and C-37—minimizes piling up, cutting in, and crushing due to multiple layer winding. This famous feature has saved Walker-Neer Spudder owners thousands of dollars in rope costs.

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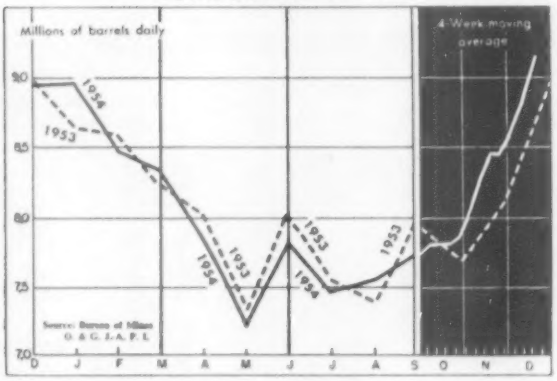
Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,348,600	UP	18,200	UP	92,509
Crude stocks	265,373,000	DOWN	1,966,000	DOWN	12,037,000
Completions	1,168	DOWN	9	UP	119
Refinery runs	7,226,000	UP	121,000	UP	308,000
Gasoline stocks	151,778,000	UP	1,125,000	UP	288,000
Four-product stocks	354,061,000	DOWN	7,672,000	DOWN	2,563,000
Total imports	1,352,900	UP	255,500	UP	267,300

TOTAL DEMAND – ALL OILS



Current Figures Indicate Record December Demand

TOTAL demand for crude and products will average more than 9,000,000 bbl. daily in December to set another all-time record. Total demand went to 8,967,000 bbl. daily in December of last year and climbed slightly to 8,985,000 bbl. daily last January, but this month will be the first with an average above 9,000,000 bbl. daily.

For the 6-week period ended December 10, total demand averaged about 8,763,000 bbl. daily, but the period included only 2 weeks of early December demand.

Major product inventories were reduced by 10,862,000 bbl. during the week ended December 10 for another postwar record. Demand for the week was estimated at 9,935,000 bbl. daily, based on the weekly A.P.I. report. Since the stock reduction amounted to an average of 1,552,000 bbl. daily, 15.6 per cent of total demand for that week was supplied from storage.

While withdrawals from primary storage were abnormally high for the week ended December 10, the continuing cold weather in areas of high concentration of oil furnaces will tend to keep demand at a high level for the remainder of December. Demand for the month may average as much as 9,500,000 bbl. daily.

Supply and distribution plans . . . Industry rumors indicate that some supply men in companies handling large volumes of home-heating fuels are beginning to feel that a very cold winter would push supply and distribution facilities to the limit.

The relatively mild weather for the past several winters has prevented a real test of suppliers' ability to deliver all the distillate needed during an extended period of cold weather. Also there has been no severe winter to test the heating efficiency in modern-styled homes.

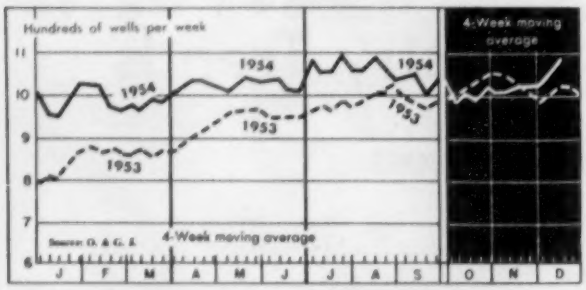
Some supply men in the Mid-Continent are reported to be completing emergency plans to use tank cars for northern movement of distillate fuels if demand in northern areas exceeds pipeline capacity. First movement would be to points where transportation advantage of pipeline plus tank truck is relatively low.

Crude supply for January . . . Recently announced increases in production allowables indicate a gain in production for January of about 300,000 to 350,000 bbl. daily. Since December production will average about 6,350,000 bbl. daily, the January output may go as high as 6,700,000 bbl. daily.

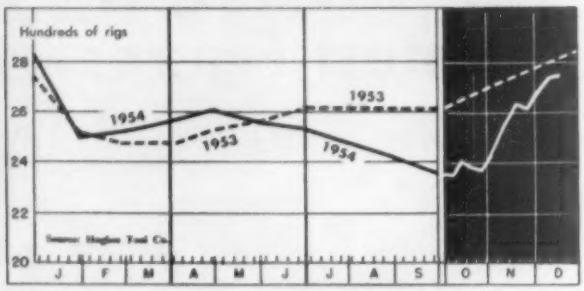
Latest company reports to the Texas Railroad Commission indicate probable crude imports of 750,000 bbl. daily for January or a total crude supply of 7,450,000 bbl. daily. Crude exports, transfers, and losses will account for at least 50,000 bbl. daily of this total, leaving about 7,400,000 bbl. daily for either crude runs or additions to storage.

Refiners have the capacity to use this much crude if product demands require it. However, it is expected that most refiners will stress product inventory reductions in January, resulting in some increase in crude stocks during the month.

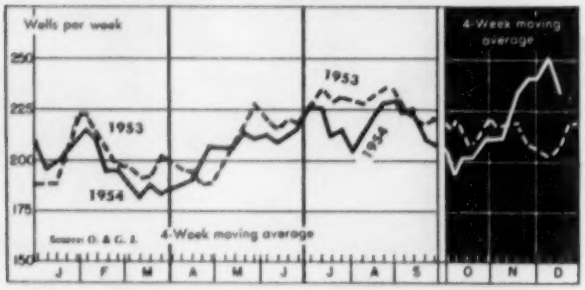
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS*

Area—	12-20-54	Change from 12-13-54	Change from 12-21-53
Gulf Coast	599	22	— 25
N. and W. Texas-New Mexico	891	— 2	46
Arkansas-N. Louisiana-E. Texas	200		1
Oklahoma	316	—16	— 97
Kansas-S. Nebraska	193	3	23
Illinois-Eastern	152	4	— 12
Rocky Mountain	251	2	— 48
Pacific Coast	150	1	— 21
Total United States	2,752	14	—133
Western Canada	211	— 1	61

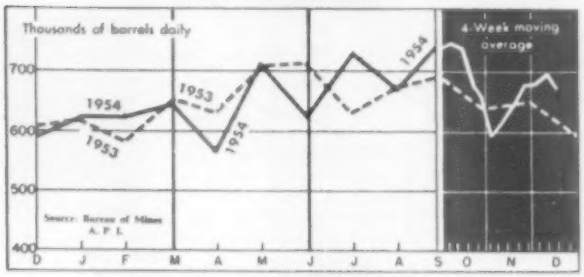
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED DECEMBER 18, 1954

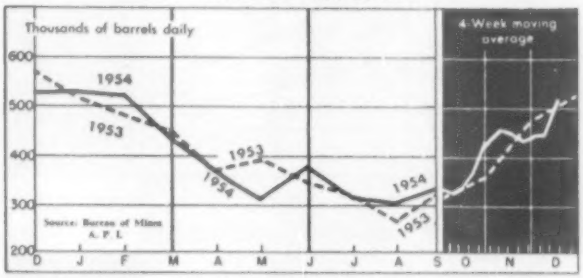
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1954	Cum. 1953	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1954: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	1	0	0	1	7,905	97	137	0	0	0	1	1	2	0	2	84	88
Arkansas	13	9	0	4	47,260	617	561	0	0	0	3	3	23	0	5	116	144
California	40	29	1	10	183,687	2,278	2,475	2	0	1	7	10	58	1	14	494	567
Colorado	32	7	3	22	166,919	1,311	708	1	0	2	12	15	39	0	21	548	608
Illinois	83	44	0	39	189,667	3,045	2,132	1	0	0	9	10	27	0	1	418	446
Indiana	28	9	1	18	41,431	837	1,286	0	0	0	8	8	9	0	1	203	213
Kansas	105	49	16	*40	366,238	4,459	4,636	1	0	1	13	15	131	0	34	598	763
Kentucky	58	38	6	14	83,368	1,158	1,146	0	0	2	9	11	18	0	6	141	165
Louisiana	110	71	10	29	735,140	3,488	2,811	2	1	1	13	17	103	53	46	362	564
North	54	38	6	10	153,573	1,927	1,264	1	0	0	6	7	20	3	17	164	204
South	56	33	4	19	581,567	1,561	1,547	1	1	1	7	10	83	50	29	198	360
Michigan	0	0	0	0	0	542	599	0	0	0	0	0	17	0	0	206	223
Mississippi	9	3	0	6	68,225	421	391	0	0	0	2	2	10	1	0	153	164
Montana	10	2	3	5	29,954	329	441	0	0	0	2	2	6	0	3	110	119
Nebraska	17	6	3	8	92,951	436	313	0	0	1	5	6	24	0	4	140	168
New Mexico	31	12	17	2	163,090	1,075	1,389	0	0	0	1	1	22	3	20	105	150
Northwest	11	0	11	0	43,998	371	610	0	0	0	0	0	4	0	18	44	66
Southeast	20	12	6	2	119,092	704	779	0	0	0	1	1	18	3	2	61	84
North Dakota	2	0	0	2	8,217	298	259	0	0	0	1	1	5	0	0	111	116
Ohio	22	6	7	*9	42,162	1,130	1,076	0	0	0	0	0	3	0	5	14	22
Oklahoma	139	88	10	†41	479,600	8,531	7,334	7	0	1	11	19	145	7	24	646	822
Pennsylvania-New York	34	8	11	‡15	78,231	2,117	2,209	0	0	0	0	0	0	0	7	36	43
Texas	379	220	12	147	1,646,071	17,943	16,694	19	0	3	74	96	750	66	159	3,997	4,972
Southwest (1 & 4)	46	29	1	16	220,506	2,512	2,693	3	0	0	12	15	105	26	43	698	872
Gulf Coast (2 & 3)	46	23	3	20	269,427	2,554	2,479	1	0	2	12	15	79	32	46	649	806
East (5 & 6)	28	10	1	17	104,813	972	783	0	0	0	8	8	17	0	14	285	316
North Central (7-B & 9)	168	85	3	80	519,534	6,811	6,323	8	0	1	40	49	346	4	23	1,626	1,999
West (7-C & 8)	75	65	0	10	474,415	4,166	3,646	7	0	0	2	9	197	1	24	663	885
Panhandle (10)	16	8	4	4	57,376	928	770	0	0	0	0	0	6	3	9	76	94
Utah	14	3	1	10	36,811	96	70	1	0	0	6	7	5	0	1	57	63
West Virginia	19	4	13	2	44,381	596	586	0	0	0	0	0	0	0	33	17	50
Wyoming	21	12	0	9	102,061	1,194	854	0	0	0	8	8	37	0	9	198	244
Miscellaneous (S. D.)	1	0	0	1	3,527	117	74	0	0	0	1	1	3	0	2	38	43
Total United States	**1,168**	620	114	434	4,616,896	52,115	48,181	34	1	12	186	**233**	1,437	131	397	8,792	10,757
Total previous week	1,177	671	76	430	4,718,154			52	1	11	198	262	1,403	130	385	8,606	10,524
Total December 19, 1953	1,049	591	63	395	4,201,914			25	3	5	201	234	1,390	108	345	8,912	10,755

Service wells included: *1, †6, ‡9.

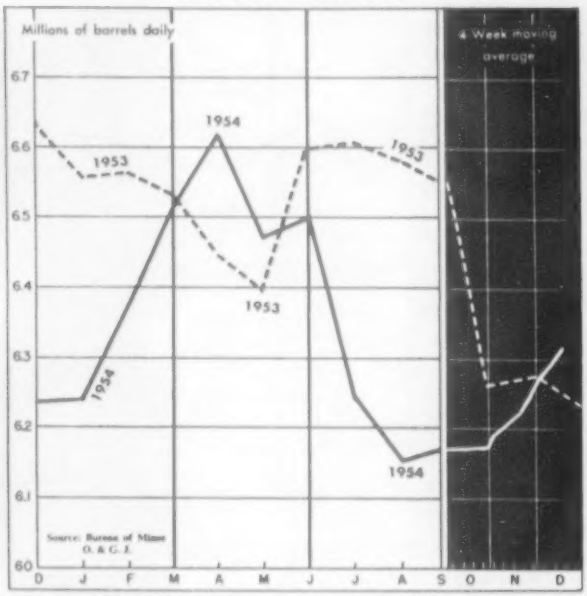
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION



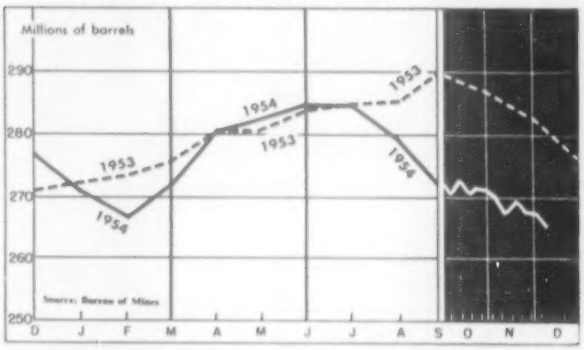
DAILY AVERAGE PRODUCTION FOR WEEK

	December 18			Dec. 11
	Crude oil	Lease condensate	Total	total
Alabama	3,900	.....	3,900	3,900
Arkansas	71,800	400	72,000	72,500
California	965,100	.....	965,100	960,000
Colorado	139,800	.....	139,800	136,600
Eastern	49,800	.....	49,800	49,800
Florida	1,400	.....	1,400	1,400
Illinois	194,400	.....	194,400	192,300
Indiana	29,200	.....	29,200	28,200
Kansas	322,400	.....	322,400	321,500
Kentucky	39,500	.....	39,500	38,900
Louisiana	597,400	48,500	645,900	646,300
North	101,400	3,000	104,400	104 800
South	496,000	45,500	541,500	541,500
Michigan	31,800	.....	31,800	31,200
Mississippi	89,500	3,800	93,300	93,300
Montana	37,700	.....	37,700	39,100
Nebraska	22,500	.....	22,500	21,700
New Mexico	212,450	2,550	215,000	214,900
North Dakota	19,600	.....	19,600	19,800
Oklahoma	507,300	.....	507,300	493,500
Texas	2,654,700	53,000	2,707,700	2,707,700
Dist. 1	46,000	475	46,475	46,475
Dist. 2	137,100	8,200	145,300	145,300
Dist. 3	416,000	25,000	441,000	441,000
Dist. 4	234,000	6,125	240,125	240,125
Dist. 5	43,000	500	43,500	43,500
Dist. 6	114,000	5,500	119,500	119,500
East Texas field	216,100	.....	216,100	216,100
Dist. 7-B	129,500	25	129,525	129,525
Dist. 7-C	175,000	4,550	179,550	179,550
Dist. 8	868,000	1,975	869,975	869,975
Dist. 9	192,000	625	192,625	192,625
Dist. 10	84,000	25	84,025	84,025
Utah	4,500	.....	4,500	4,700
Wyoming	245,100	.....	245,100	252,800
Others	‡500	.....	‡500	300
Total U. S.	6,240,350	108,250	**6,348,600**	6,330,400
Change from previous week, up			**18,200**	
Canada	†312,400	.....	†312,400	†247,575

Total U. S. Production January 1-December 18 ..... 2,230,893,925 bbl.
Same period last year (crude plus cond.) ..... *2,278,559,825 bbl.

*Includes 31,960,875 bbl. condensate. †Week ended previous Monday. ‡S. D. 200, Nev. 300.

CRUDE-OIL STOCKS



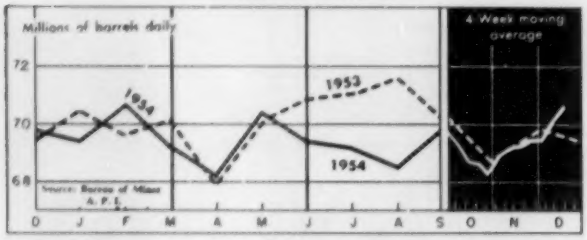
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

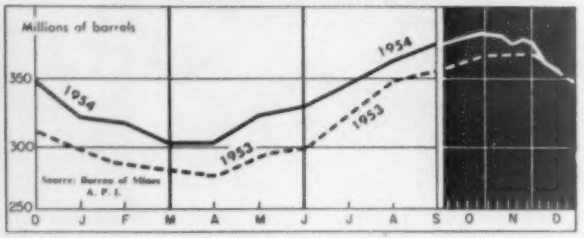
	Dec. 11, '54	Dec. 4, '54	Dec. 12, '53
Pennsylvania Grade	3,082	3,120	2,617
Other Appalachian	1,893	1,835	1,680
Illinois, Indiana, Michigan	12,402	12,021	12,243
Nebraska, N. Dakota	1,789	1,658	(‡)
Kansas	8,226	8,341	8,745
Oklahoma	25,521	26,083	26,819
Arkansas	3,163	3,223	3,431
Louisiana	15,543	15,482	17,252
North	2,364	2,436	3,110
South	13,179	13,046	14,142
Mississippi	3,103	2,962	3,437
New Mexico	8,053	8,601	8,947
Texas	120,340	121,230	130,189
East Texas proper	10,209	9,878	11,491
West Texas	52,862	53,168	55,404
Texas Gulf	24,457	24,338	27,369
Other Texas	32,812	33,846	35,925
Wyoming	13,374	13,309	13,440
Other Rocky Mountain	5,730	5,996	3,485
California	31,856	31,730	34,662
Foreign	†11,298	11,748	10,463
Total	265,373	267,339	277,410

*Bureau of Mines. †Includes 3,130,000 bbl. in California. ‡Included with Kansas.

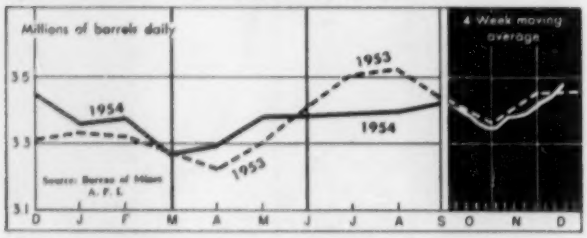
REFINERY RUNS



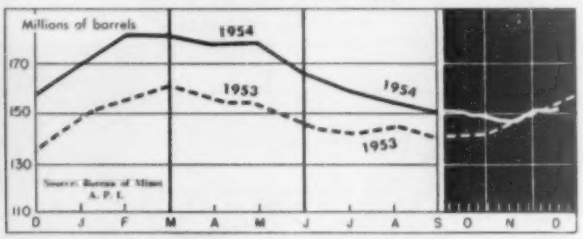
FOUR-PRODUCT STOCKS



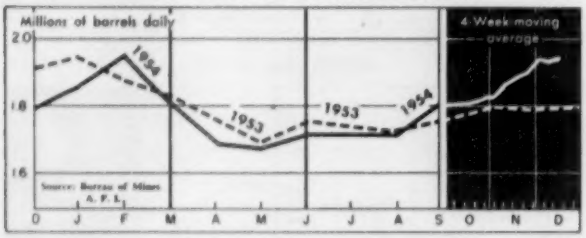
GASOLINE PRODUCTION



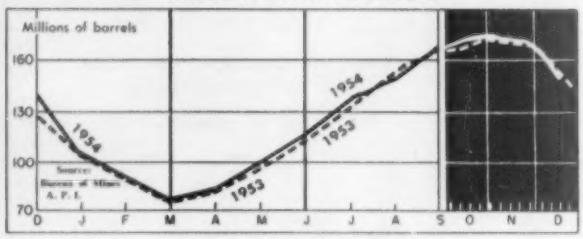
GASOLINE STOCKS



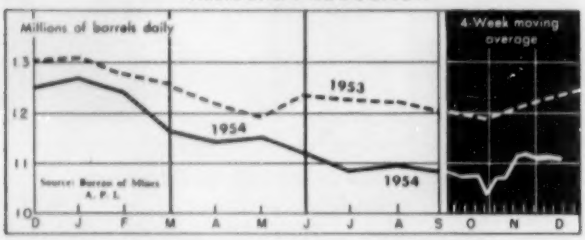
MIDDLE-DISTILLATE PRODUCTION



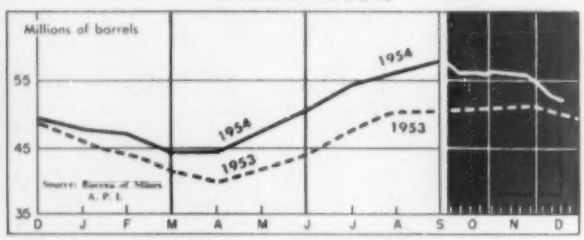
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, DECEMBER 17

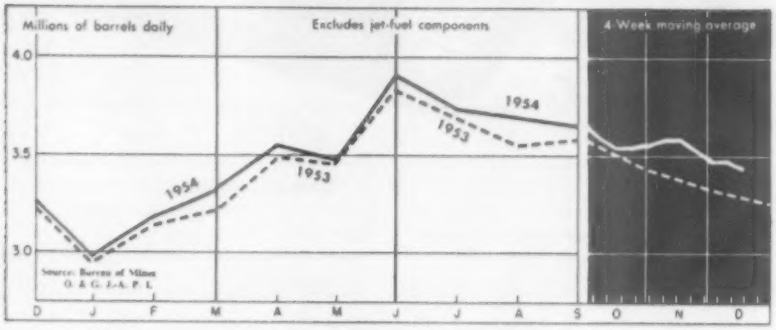
(Excludes all jet-fuel components)

(Thousands of barrels)

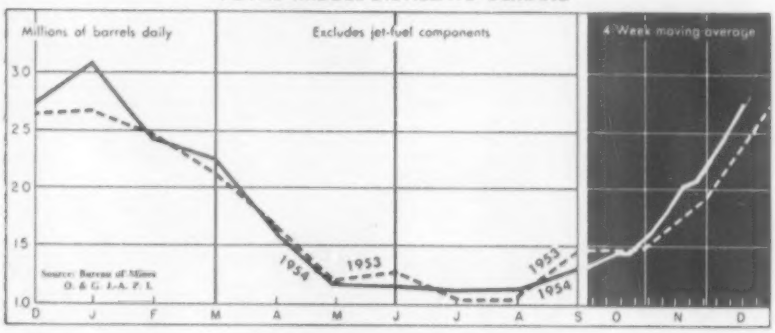
District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, December 1953 — Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,065	448.6	33.4	262.4	249.2	32,351	12,537	42,942	9,647	1,018	446.4	44.3	232.9	227.1
Appalachian:														
District 1	88	35.0	6.6	17.3	6.1	4,508	543	2,263	524	118	50.6	6.0	25.7	13.1
District 2	79	37.4	5.6	14.3	8.1	2,407	492	733	176	81	44.7	5.7	15.7	11.1
Ind., Ill., Ky.	1,343	719.9	86.0	255.0	160.9	32,353	8,291	21,439	3,707	1,314	719.6	86.6	233.2	199.5
Okla., Kans., Mo.	657	360.2	18.3	157.4	41.4	14,161	2,113	11,852	1,296	572	353.4	11.1	124.3	48.7
Inland Texas	225	170.1	8.8	42.7	18.3	5,606	356	2,164	1,348	240	179.8	13.6	36.7	29.0
Texas Gulf Coast	1,809	806.9	126.4	478.1	220.9	22,707	3,369	15,759	4,370	1,655	812.3	128.7	399.2	243.6
La. Gulf Coast	592	322.7	55.0	164.7	32.1	10,833	2,698	4,164	1,150	549	288.9	60.7	134.3	50.2
N. La. and Ark.	91	38.0	6.6	22.9	7.1	3,375	886	1,794	139	83	35.6	10.3	19.3	7.0
Rocky Mountain:														
New Mexico	20	11.1		3.3	2.9	201		89	36	16	10.3	1.0	2.0	3.1
Other Rocky Mt.	238	115.7	4.7	59.2	38.7	5,559	247	2,139	757	244	123.0	4.2	55.8	41.4
California	1,019	431.3	5.7	178.0	331.2	17,717	404	12,744	29,115	1,074	464.4	5.4	161.6	373.0
December 17, 1954	7,226	3,496.9	357.1	1,655.3	1,116.9	151,778	31,936	118,082	52,265	6,964	3,529.0	377.6	1,440.7	1,246.8
December 10, 1954	7,105	3,512.7	383.6	1,539.6	1,125.7	150,653	34,210	124,067	52,803					
December 19, 1953	6,918	3,365.0	344.9	1,451.0	1,183.0	151,490	31,945	123,214	49,975					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.

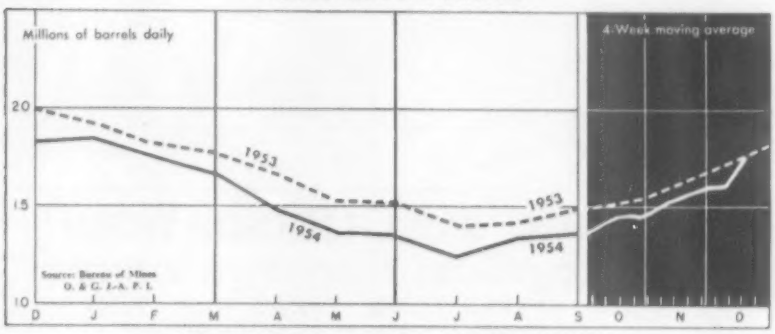
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of December 22, 1954. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.375-11	11.25-12	10.50-10.75
Premium gasoline	11.5-12	13-13.75	11.50-11.75
42-44 w.w. kerosine	9.375-9.5	10.7	9.25-9.5
No. 2 straw fuel oil	8.5-8.625	9.95	8.75-9.0
No. 6 residual	$1.45-1.55	$2.35-2.45	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.5	5.0	5.25
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX
Mid-Continent

132-134 A.M.P.	6.0

• Increased demand for light heating oils on the East Coast has been due to cooler weather. For the period from September 1 through December 16, weather in New York Harbor was slightly cooler than normal and 350 degree days cooler than the same period last year.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 12-17-54	3,486	3,435
September 1954	3,511	3,586
November 1953	3,444	3,330
December 1953	3,453	3,253
Middle distillate:		
Four weeks ended 12-17-54	1,953	2,745
September 1954	1,815	1,415
November 1953	1,785	1,926
December 1953	1,794	2,707
Residual fuel:		
Four weeks ended 12-17-54	1,104	1,733
September 1954	1,086	1,368
November 1953	1,223	1,654
December 1953	1,247	1,809

CRUDE PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.*	Oklahoma, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Includes New Mexico Permian.

Effective dates: California, February 16, 1953; east of California, June 15, 1953; Pennsylvania Grade, December 1, 1954.

FLAT CRUDE PRICES

Representative posted schedules per barrel	
Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	3.35
Middle District	3.25
Southwest Pennsylvania	2.93
West Virginia	2.82
Ohio	2.76
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Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

FOR SALE EQUIPMENT

1—MODEL RL 3-Drum Cardwell Powered with Buda Model 844D Diesel Engine. Rig and Engine in Perfect Condition. 1-87' 2-Pole Mast. Box H-404, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—Horizontal Duplex Steam Pumps—10x8½x12—383 GPM—bronze fitted—max. discharge pressure 100 lbs.—6" suction—6" discharge—mfg. by American Marsh Co. Quantity available—NEW—Boston Metals Co. 313 E. Baltimore St., Baltimore 2, Md., Curtis 7-5050.

COMPLETE RIG: New U-15 Drawworks with four 250 Horse Power Cummins diesel engines through hydraulic couplings, hydromatic brakes on 127-foot 450,000-lb. Lee C. Moore mast and substructure, 8,000 Ft. 4½" Drill Pipe, 14 new 7" O.D. x 2⅞" Bore Drill Collars, new Emsco D-500 7½" x 16" pump, new Cameron twin hydraulic BOP, and all accessories. Good condition. Now drilling 4,000-ft. well in Rocky Mountain area. Inventory on request. Box H-403, The Oil and Gas Journal, Tulsa, Oklahoma.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-56 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 133—Rockdale, Texas
AT-3427—Houston, Texas

GASOLINE PLANT *FOR SALE*

Gasoline Plant, located in Brazoria County, Texas, shut down in January, 1954. Had been processing approximately thirty-three million feet of gas daily with absorber pressure approximately six hundred thirty pounds. Plant recovered Propane, Butane, Gasoline, Kerosene and Diesel Oil. Adequate storage tanks for all products. Drum Lead Blending Plant. Detailed inventory available upon request.

SOUTHERN PRODUCTION CO., INC.
P. O. Box 670, Ft. Worth, Texas

USED EQUIPMENT

Franks model 2000 Core Drill double drum drawworks; 48 ft. derrick; 5 x 8 pump; table, swivel, kelly, elevator, elevator links; mounted on 1946 International truck.

Franks SAL 4500 Skid Rotary Rig Cummins Power, 96' Derrick. Located, Tulsa, Oklahoma. O.C.S. Type 3 Servicing Unit mounted on 1942 Mack Truck. Located Odessa, Texas.

Write, Wire or Call

FRANKS MFG. CORPORATION
BOX 3218, WHITTIER STATION
TULSA, OKLAHOMA

FOR SALE EQUIPMENT

FOR SALE: 3600' 4½" extra hole drill pipe, good for shallow drilling, $.90 per foot. Terms. Melton Supply Company, Box 1360, Seminole, Okla.

FOR SALE: Sullivan 200 complete with all tools ready to work. Located Tulsa, Okla. Contact R. F. Mesker, Phone 6-0057 or 5-9357, Tulsa.

FOR SALE: 1954 Cessna, 195, equipped w/ Lear Exec. ADF, VHF, LF Marker Beacon, Dual landing lights, cross wind gear. Less than 80 hrs. total time. This plane offered for sale due to purchase of Twin Beech. Herley Supply Co., 3040 Cherry Avenue, Long Beach 7, Calif. Phone L.B. 41687 or Nevada 62087.

FOR SALE—Truck mounted seismograph instruments of modern design, built by Southwestern Industrial Electronic Company, with multiple geophones and Vector Cable—Shooting truck with Griffin body complete with loading poles and blaster—Metal dynamite magazine trailer—Field office equipment—Also Power reel, Vector Cable with 12 geophones for Marine operation. Box H-554, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: One U-15 Rotary Rig, Complete. Jack Smith, 502 Combs-Worley Bldg., Pampa, Texas. Phone 4-2682 or 4-9814.

FOR SALE at our Oklahoma City Warehouse 2850' 3½" OD 9.3# 10V thread used seamless steel upset tubing. Price 50 cents per foot. Take all. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE EQUIPMENT

FOR SALE: 2—Cardwell RL double-drum spudders complete with lines and tools, also spare 145 H.P. GKU motor and transmission. Now working in Oklahoma. Oklahoma City, Oklahoma, Phone ME 7-2242. Write: Box 4294.

FOR SALE—In Lindsay, Oklahoma field, 7—high 500 bbl. erected flat seam used bolted steel tanks. Price $350.00 each, as is. Contact T. P. Mace, ME 6-3331, Oklahoma City, Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: 1—7¼" x 12" FZ-FXZ Gardner-Denver Pump unitized w/ Model 6LROU Waukesha Gasoline—Natural Gas—Butane Engine and #8A Demco Circulating Type Rod Oiler. Pump has been in use less than 60 days. Box H-545, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—At our Oklahoma City warehouse, one Ingersoll-Rand 8" x 3¼" x 8" portable compressor, 1000# starting pressure, 500# operating pressure, price $1500.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE: ENGINE—165 Hp. Climax Model R61, maximum continuous Hp. rating 126 Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

ANOTHER BRILL LIQUIDATION!

FORMER CONSUMERS COOPERATIVE REFINERY
LEVELLAND, TEXAS
(30 Miles West of Lubbock on Highway 290)

3'10" x 38" Vessel, 325# WP

5'3" x 38'6" Vessel, 90# WP, Chr. Lined

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10—2000, 1000 bbl. Welded Tanks

6' x 58' x ⅛" Shell Fractionating Tower, chr. lined; built 1951, used 9 months.

6'6" x 55'; 6' x 27'; 5' x 27'; 3' x 49'; 30" x 35' Towers.

1800, (4)500 sq. ft. Adm Ht Exchangers.

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200, 268, 730 sq. ft. Steel Reboilers.

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BJ 5 Stage Ni. Chr. Centrifugal Pump, 400 GPM, 2100 ft. hd.

20—2", 3", 4" BJ Centrifugal Pumps XPF Motors.

15—Duplex Piston Pumps from 6" x 3½" x 6" to 14" x 6¾" x 12".

IR 15" x 7" x 14" Steam Driven Duplex Air Compressors.

3—Upshot Heater Stills, chr.-moly. Tubes

4—Water Tube Boilers—511, (3)205 hp.

Ethyl Lead Plant complete with Tank, Weigh Scale, Pumps, Meters, etc.

4-Spot Truck Loading Dock, built 1952, complete with Meters, pumps, etc.

Thousands of Feet 2", 4", 6" Pipe; unused 2", 4", 6" Pipe (Schedule 40, 80, 160) Unused 3" Boiler Tubes; 3", 3¼" chr. Still Tubing; Valves; Fittings; Return Bends; Hardware too numerous to mention.

Detailed Circular Upon Request.

BRILL EQUIPMENT COMPANY
4101 San Jacinto St., Houston 4, Texas. Locust 1351
New York Office: 2401 Third Ave., New York 51, N. Y. Cypress 2-5703

FOR SALE EQUIPMENT

CORE DRILLS—Acker Model for 150' coring $1855. Acker Model for 350' coring $2715. Acker Model for 800' coring $5410. Everything for well drilling. S. W. Pressey & Son, Pueblo, Colo.

U-15 WITH hydromatic brakes, powered by four 250 Horse Power Cummins diesel engines through hydraulic couplings with 127' Lee C. Moore mast, 4½" drill pipe, 6¼" drill collars. Oilwell 14P pump, mechanical Shaffer double BOP and all accessories for complete rig. First class operating condition. Rocky Mountains. Inventory on request. Box H-405, The Oil and Gas Journal, Tulsa, Oklahoma.

HALL SCOTT INVADER Engine Parts. New war surplus, large inventory, 50% to 75% discount, send for parts list. Abar Metals Company, 1902 E. Olympic Blvd., Los Angeles 21, California.

FOR SALE: 5000' rig. 1 250 Bethlehem complete drilling rig less derrick. 5000' drill pipe. Compound with two D-13000 Cats and 14 inch Bethlehem pump. Located: Wampler Bros., Box 1987, Longview, Texas. Phone PL 92312.

FOR SALE: Franks Well Servicing Unit with mast on International KB-8 truck. McDaniel Well Service, Seminole, Oklahoma.

FOR SALE: 2—TC-44-15 Lufkin Twin Crank Pumping Units, 19.8 H.P. 48" Stroke with Model DE Case Engines, Belts and Sheaves complete. 2—TC-3-18B Lufkin Twin Crank Pumping Units, 33 H.P. 54" Stroke with 25 H.P. Cooper-Bessemer 2-Cylinder Vertical Gas Engines, Belts and Sheaves complete. All equipment reconditioned and in good shape. Overton Supply Company, P. O. Box 548, Phone 2721, Overton, Texas.

FRANKS MODEL 5000—Bargain: 1-Cummins HBI-600 engine in good condition equipped with spudding attachment, skid and 65' double leg (8⅝ x 7" legs) mast. Call Amherst 73311 Wichita, or write P. O. Box 2001, Wichita, Kansas.

THREE #12 Sweetland Filters, 48 bronze leaves, monel covered, on 3" C.C., now located in southwest, available for inspection. 11 Sperry 18" x 18" cast iron Filter presses. 11 chambers. Consolidated Products Co. Inc. #65 Garden Street, Hoboken, N. J. N. Y. Tel.: BArclay 7-0600.

SAVE MONEY on 8" Line Pipe

Lapweld 8⅝" O.D. 28.55#

Very good #1 grade, used pipe. Straight 20' single random lengths, machine cleaned.

Choice of plain end bevelled for welding, or screw end threaded and collared.

Ideal for oil, water and gas systems, 850 to 900 psi.

Pipe located in Illinois, with low barge, rail and water rates to any part of the world.

Can ship unlimited quantities, at guaranteed rate of 28,000 feet per day.

Priced below market, selling at almost ½ cost of equivalent new pipe.

Will sell for cash, or will finance meritorious propositions.

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FOR SALE EQUIPMENT

FOR SALE at Oklahoma City, 9—200 HP Bessemer Type X Gas Engine Compressor Units, equipped with 17" x 20" Bessemer or Baash-Ross overhead exhaust power cylinders and 7" or 8" x 20" high and 14" x 20" low compressor cylinders. Contact T. P. Mace, Oklahoma City Warehouse or Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

FOR SALE: Used Model 15-A-15 Fluor Aerator Cooling Tower. To be dismantled by purchaser. Frawley Corp., 8790 Hays, Culver City, Calif.

BEST NATIONAL 75 in Oklahoma. Complete L.C.M. derrick. New drill pipe. Plenty of extras. For inventory write Box H-562, The Oil and Gas Journal, Tulsa, Oklahoma.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

EQUIPMENT WANTED

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

LATE MODEL air unit or National drawworks, without engines, suitable 6000 ft. drilling. One package used gas compressor, discharge 800#, intake 350#, 750,000 ft. per day. Box 297, Tyler, Texas.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer See box heading for classified rates or write The Oil and Gas Journal.

HELP WANTED

WANTED: SUPERINTENDENT for Construction Co. who build oil field roads and locations. Permanent opening. Give age, experience and references. D S & R Construction Co., P. O. Box 1216, Sweetwater, Texas.

WANTED TO BUY:

Good used 16" OD x ¼" wall Plain End Gas Line.

CENTRAL PIPE & SUPPLY CO.

Box 1466—Phone SHerwood 4-7404
Lubbock, Tex.

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Experienced graduate engineers or recent graduates, for immediate and future job openings in Saudi Arabia and New York City. For engineering work in development, production, drilling, process, and oil and gas engineering on primary and secondary recovery problems.

Salaries commensurate with education and experience. Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 79

ARABIAN AMERICAN OIL CO.
505 Park Avenue, New York 22, N. Y.

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

WANTED. One Toolpusher, must have proven background, no floaters; when you prove your ability, you will get above average salary. When you reply, advise experience and where you worked before. Box H-558, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE ENGINEER OR GEOLOGIST
At least five years experience with cable tool and rotary drilling methods and Turbine pumps—to design SELL and supervise construction of water wells in Minn., N. D., S. D., Mont., Wisc., Iowa for industry and municipalities. Salary plus profit sharing. Give all experience and references in detail in first letter. All replies held strictly confidential. McCARTHY WELL COMPANY, 670 Eustis St., St. Paul, Minn. NATION'S OLDEST and N.W.'s LARGEST SINCE 1860.

JUNIOR PETROLEUM ENGINEER: Oil Company in Kansas has opening for Junior Engineer in Petroleum Engineering Section. Duties will include maintaining an oil treating program. Facilities are available in the company to obtain experience in exploration, drilling and production. Applicant must have a degree in Petroleum Engineering or equivalent. Experience not a requirement. Write Box H-559, The Oil and Gas Journal, Tulsa, Oklahoma, giving personal qualifications and salary expected.

MECHANICAL ENGINEER—Experienced in Design of Rock Bits. Excellent opportunity with expanding organization located in Southwest. Engineering Degree not necessary but at least two years college preferred. Work involves design and development of Rock Bits for Rotary Drilling. All replies confidential. Box H-560, The Oil and Gas Journal, Tulsa, Oklahoma.

PIERCEMENT SALT-DOME, subsurface geologist needed for work involving Louisiana Gulf Coast problems. Excellent opportunity for highly experienced man. HUNT OIL COMPANY, Dallas, Texas.

PETROLEUM ENGINEER, preferably recent graduate, for West Texas and New Mexico work. Duties to assist in production and reservoir engineering. Operating subsidiary of large corporation. Reply giving age, college record, previous experience, if any, military status, and address and telephone number of one character reference. Box H-546, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

ENGINEERS

for aggressive manufacturing company in midwest. Graduate engineers or engineering background, in design or development work for control equipment, used in oil and gas production. Organization also needs sales engineers experienced in above lines. Company offers excellent benefits with salary review every six months. Salary range $5000 to $7000. Company pays our service charges. All information confidential. Send resumes to

Chas. J. Loveless Personnel Service,
616 S. Main, Tulsa, Oklahoma.

SITUATIONS WANTED

MANAGEMENT WITH aggressive independent with opportunity to participate. Eighteen years experience, management land production, and drilling departments. Box H-537, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM ENGINEER, 36, married, desires position with independent producer or independent oil company. Have had 10 years experience as petroleum engineer and administrative assistant with major oil company and as drilling superintendent for drilling contractor. Box H-552, The Oil and Gas Journal, Tulsa, Oklahoma.

INDUSTRIAL LUBRICATION Specialist, 26 years training and experience in sales, application and technology. Services available full or part time in vicinity of Houston, Texas. Box H-553, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

PRODUCTION ENGINEER—Age 31, 3½ years major company experience, Gulf Coast and West Texas, desires position with independent oil company. Box H-562, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN-GEOLOGIST desires retainer in Houston. Experienced in all phases of leasing, drilling deals, farmouts. Young, ambitious, family man. Box H-548, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

Well organized, well established oilwell drilling contractor desires the management and supervision of oil properties in West Texas, Central Texas, and New Mexico. Can provide complete handling of oil properties, from acquisition to production. No properties too small, and none too large to handle. Inquiries from independents, groups, small or medium sized oil companies invited

Write, wire, or call collect for further information.

MAKIN DRILLING COMPANY

P. O. Box 1628, Hobbs, New Mexico.
Phone 3-3141.

146 Allen Building, Midland, Texas.
Phone 2-2962.

BUSINESS SERVICE

Delaware Corporations formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

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For your Texas Headquarters

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Branch Office—
503 Pioneer American Ins. Bldg.
Houston, Texas—ATwood 7428

ROYALTIES

WISH TO BUY producing royalties. Box H-379, The Oil and Gas Journal, Tulsa, Oklahoma.

JACK EAGLE, Oil Properties, 706 City Nat'l. Bld., Oklahoma City, Oklahoma. Telephone REgent 6-7027.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

DRILLING AFTER January first, offset lease to 300 bbl. well with 23 ft. of sand. One thirty-second over-ride, $1,500. P. O. Box 26, Tulsa.

HAVE SEVERAL good drilling sites in California proven area, production close in, seeking someone to pay cost of drilling. Will complete wells at our expense share on a 50-50 basis, have excellent locations in Signal Hill, Long Beach, Huntington Beach. Box H-561, The Oil and Gas Journal, Tulsa, Oklahoma.

KANSAS WATER FLOOD oil lease for sale, has 1200 acres, five wells plus water wells, Gaso pressure pump, tanks and other equipment, owner Mr. O'Chamis, G. Dehne, Chanute, Kansas, Ph. 1215.

SUPERIOR OIL CO. holds ½ of this mineral lease, will lease the other ½ interest, 64.4 acres undivided net of 96.6 tract, Young County, Texas. About 6 miles N.E. Eliasville. For 3 year lease, $100.00 per acre, OK as approved by attorney. Lessee to pay title check. Inquiries, P. O. Box 722, Clifton, Arizona.

SEE A. L. BOWLES, Box 947, Ada, Okla., for drilling deals and producing royalties if you have the cash for Oil Investments.

Will pay cash instantly for lease (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and you haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

LEASES ROYALTIES

Producing and Nonproducing Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY

6635 Delmar Ave., St. Louis, Mo.

DRILLING CONTRACTS OFFERED

KETA GAS & OIL COMPANY
NOW IN LIQUIDATION

. . . proposes to sublease or farm-out acreage to interested parties who will drill wells thereon. The company has substantial interests, by leaseholds and in fee, on major gas-producing and potential gas-producing structures in Pennsylvania.

At this time the company is offering acreage on the Cogan House structure, Lycoming County and Cherry Hill structure, Indiana County, Pa. Offerings will be in substantial blocks and on terms favorable to the driller.

Terms and specifications may be obtained by inquiring at the office of the company, 460 Market Street, Williamsport, Pa. Telephone Williamsport 2-6161.

S. DALE FURST, Pres.

Keta Gas & Oil Company

REAL ESTATE

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

PRODUCTION FOR SALE

SELL QUARTER Working Interest under 160 acres. One well flowing 45 bbl. per hr. 26 feet sand. $20,000 Cash. P. O. Box 26, Tulsa.

SOIL ANALYSIS

SOIL ANALYSIS
Learn a better method of finding oil. Test hydrocarbons from oil directly. Do it yourself. Free details. Surfac Oil Surveys, Box 10218, Fort Worth 14, Texas.

WANTED

ESTABLISHED Manufacturer's Agent desires additional lines, Production, Drilling, Industrial. Ark.-La.-Tex. area. Box H-550, The Oil and Gas Journal, Tulsa, Oklahoma.

MANUFACTURERS' REPRESENTATIVE
Established corporation in Houston serving Oil, Chemical and Paper Industries in Louisiana and Southern Texas, now handling process equipment and corrosion proof construction materials, desires related accounts. Box H-541, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—IDEAS
Inventions that are related or can be adapted to the oil industry. We offer capital, technical advice, patent assistance, market research, a manufacturing plant, and a sales outlet; everything to put your invention on the market. Write P. O. Box 1665, Houston 1, Texas.

BUSINESS OPPORTUNITY

RECENTLY ORGANIZED Eastern group with venture money for drilling of wildcats, development, farmouts. You are dealing directly with principals. Box H-538, The Oil and Gas Journal, Tulsa, Oklahoma.

RECENTLY ORGANIZED group seeking proven oil property with an income of $10,000 to $40,000 per month. You are writing directly to the principals. Prompt action. Box H-526, The Oil and Gas Journal, Tulsa, Oklahoma.

PRINCIPAL WILL PURCHASE: Oil Property from Independent, or—**Producing Oil Co.** (stock or property),—**Oil Royalty Co.**, either stock or property where Purchase Price Valuation is $200,000.00 and up.

Box H-547, The Oil and Gas Journal, Tulsa, Oklahoma.

Manufacturers Agent

Specializing in Pipeline and Tankage Equipment
Will
Represent Additional Lines
We offer sales, installation, service and Warehouse facilities.

H. & H. Co.

583 N. Union Pl. Tulsa Phone 54-0300

Hance Named by Kaiser To Head Advertising

Harrison H. Hance has been named to take charge of advertising and publications for Kaiser Steel Corp. it has been announced recently by A. P. Heiner, vice president in charge of public relations and traffic.

Hance joined Kaiser Steel after 6 years with Kaiser Services, last serving ing as assistant to the manager, public relations and advertising. Before 1948 he was with Tide Water Associated Oil Co. Other duties with Kaiser Services included that of publications manager, and managing editor, Kaiser Publications.

GREAT LAKES

Production Continues Excellent At New Traverse Discovery

Oil production from the James J. McGerry, Trustee 1 Cook, NE NE NW 7-11n-11w, Ensley Township, Traverse oil discovery well, Newaygo County—Michigan's newest and most important 1954 Traverse discovery, has been averaging from 99-118 bbl. of oil a day as various choke arrangements have been tested in an endeavor to restrict production to 100 bbl. a day.

Last reported choke was at 8/64-in. At previous opening, a 10/64-in. choke, well flowed an average of 130-140 bbl. a day. Wildcat has not shown water since being acidized with 500 gal. Traverse top was logged at 2,431 ft., pay was encountered at 2,340-41 ft., and hole was bottomed out at that depth. The 1 Cook flowed about 25 bbl. a day natural.

Ace Oil Co., on a farm-out from McGerry, was ready to drill at its 1 Cook, SW SE SE 6-11n-11w. McGerry et al, had location staked for the west 20-acre offset to the discovery, in the NE NW NW 7-11n-11w. These appeared to be the first new starts in the area at last report. Wildcat, located about 2½ miles south of Croton-Traverse oil pool, is showing much more potential production strength than did any well drilled in this older pool to the north.

• An interesting wildcat, outpost north of Northville Trenton oil pool, was showed for about 45 bbl. of oil a day natural on the pump at the John Parris 1 Shaw, SW NW NW 36-1n-7e, Lyon Township, Oakland County. Top of Trenton was logged at 4,504 ft. Hole was bottomed out at 4,648 ft. This outpost is at least 1 mile north of the nearest Trenton producing well in the Northville pool. Trenton oil and gas pays at this well showed at points from 4,629-48 ft. This development may be one of the most important on the fringe of the Northville structure to date.

MICHIGAN

Newaygo County: James J. McGerry, Trustee 1 Cook, NE NE NW 7-11n-11w. Traverse 2,431 ft., IP 6 BOPH, 11/64-in. choke after 500 acid, Pay 2,440-41 ft., TD 2,441 ft. (New pool—Ensley.)

LEGAL

SEALED BIDS will be received until 2:00 P.M., Mountain Standard Time, December 28, 1954, and opened at that time in the Office of the Fort Peck Indian Agency, Poplar, Montana, for the leasing of 80.00 acres of Tribal land, located in Roosevelt County, Montana, for oil and gas mining purposes. The details of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the Superintendent of the Fort Peck Indian Agency at Poplar, Montana, or telephone Poplar, 2181.

EQUIPMENT MEN

Fuller Names Passage to Manage New Tulsa Office

Fuller Manufacturing Co., Kalamazoo, Mich., has announced the opening of its new Southwest district office in Tulsa. The new office is under the management of Howard J. Passage. Passage will function as sales and service counsel for all Fuller products and those of its transmission division, unit drop forge division, and Shuler Axle Co., a Fuller subsidiary, in the states of Texas, Louisiana, Mississippi, Oklahoma, Arkansas, Missouri, and Kansas, as well as the Memphis, Tenn., trading area.

Prior to his new assignment, Passage was associated with Fuller's transmission division at the Kalamazoo factory. He has had wide experience in both sales and service of transmissions and axles and is eminently qualified for this new position.

Baroid Transfers Felker to Houston

Charles W. Felker, senior engineer of Baroid Division, National Lead Co., at Lafayette, La., has been transferred to Houston as sales representative of the Gulf Coast division.

Felker, who joined Baroid in January 1948, has been working in the Louisiana area, flying amphibious aircraft as a service engineer. In addition to his duties as sales representative at Baroid, Felker is the pilot for the company airplane based at Houston.

Babcock & Wilcox Buys Globe Steel Tubes Assets

The assets and business of Globe Steel Tubes Co., Milwaukee, have been purchased by Babcock & Wilcox Co., according to an announcement made by both companies. The announcement said that terms of the transaction were approved by the boards of directors of both companies and revealed that the selling price was approximately $9,300,000. Stockholders of Globe Steel Tubes will get cash for their holdings.

Babcock & Wilcox announced that it will continue to operate the Milwaukee plant as a part of its Tubular Products Division and present production personnel will be retained. Arrangements have also been made with key management personnel to continue as employes of Babcock & Wilcox.

Globe Steel Tubes manufactures seamless and welded stainless, alloy, and carbon-steel tubing as well as a variety of pressure tubing and welding fittings.

Honeywell Purchases Stock of Doelcam Corp.

Minneapolis - Honeywell Regulator Co. has purchased all of the outstanding capital stock of Doelcam Corp. of Boston, Mass., manufacturer of precision instrument and control equipment for industrial uses, Paul B. Wishart, Honeywell president, announced recently.

Wishart said the New England firm, which has a main plant and administrative offices in Boston and another plant and engineering laboratories in Newton, Mass., would be operated as a new division of Honeywell. There will be no change in the management, headed by John J. Wilson, president and founder of Doelcam.

Wishart further stated that the acquisition of Doelcam carried forward Honeywell's planned program of diversification and would extend the corporation's business into new product lines of highest quality.

Texas Instruments Buys Plant Site at Houston

J. E. Jonsson, president of Texas Instruments, Inc., Dallas, has anounced that Texas Instruments has purchased 6 acres of land in Houston. Jonsson stated that plans are now being considered for construction on the land of a new plant and general headquarters for Houston Technical Laboratories, a wholly owned subsidiary of Texas Instruments. Houston Technical Laboratories manufactures gravity meters, geophysical instruments, and optical components for the petroleum industry.

S. R. Bowen Establishes New Glendive Store

James Wilcox, vice president of S. R. Bowen Co., has announced the establishment of a new store at Glendive, Mont., to better serve the Rocky Mountain area. This new store, with Roy Gillam as manager, maintains a full line of S. R. Bowen fishing tools and specialties, and features 24-hour service.

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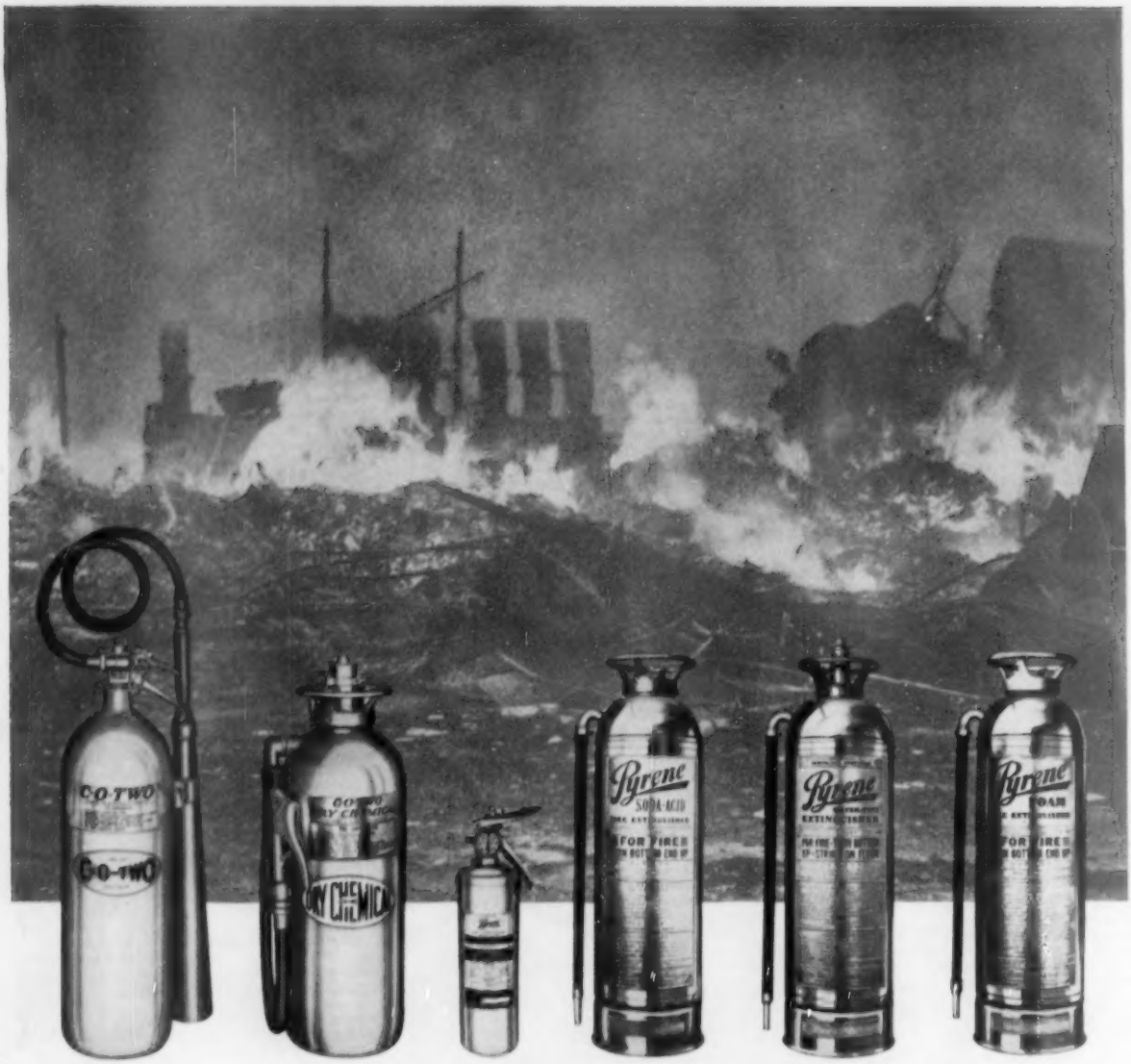
LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington, D. C. Notice is hereby given that three parcels of land totaling 391.88 acres within the known geologic structure of the Lake Bistineau field, undefined, Bienville Parish, Louisiana, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 p.m., E.S.T., January 12, 1955, when bids will be opened. Details of the lease offering, description of the lands, how and where to submit bids, and bid forms may be obtained from the Director, Bureau of Land Management, Washington 25, D. C., L. E. Hoffman, Minerals Officer.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that two parcels of land containing 280 acres within the known geologic structure of the Pine Mountain field, Natrona County, Wyoming, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 p.m., E.S.T., January 26, 1955, when bids will be opened. Details of the lease offering, description of the lands, how and where to submit bids, and bid forms, may be obtained from the Manager of the Land Office, Cheyenne, Wyoming, or from the Director, Bureau of Land Management, Washington 25, D. C. L. E. Hoffman, Minerals Officer.



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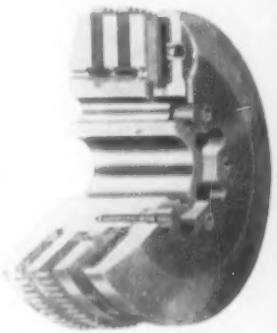

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